

THE IRON AGE December 6, 1934

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DECEMBER 6, 1934

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The Appointed Time

IT is our firm opinion that this is the appointed time for business and industry to gird up their loins and step forth to battle for better and bigger business.

There are several good sound reasons back of this opinion.

One of these is, perhaps, a negative reason, but important nevertheless. It is that the theorists and experimenters have been given their chance and have failed to make good. The professorial sword no longer hangs over the heads of those who have to deal with cold facts and meet actual payrolls.

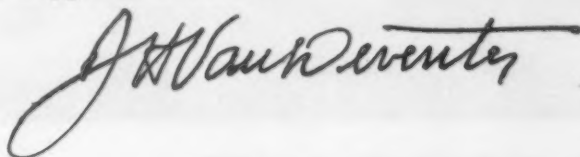
The second sound reason, also more or less a negative one, is equally important. It is that organized labor has had and has spent its political fling. Hereafter it must earn whatever advancement it may achieve, not by political chicanery, but by the demonstration of enlightened leadership which puts public interest ahead of union funds and power.

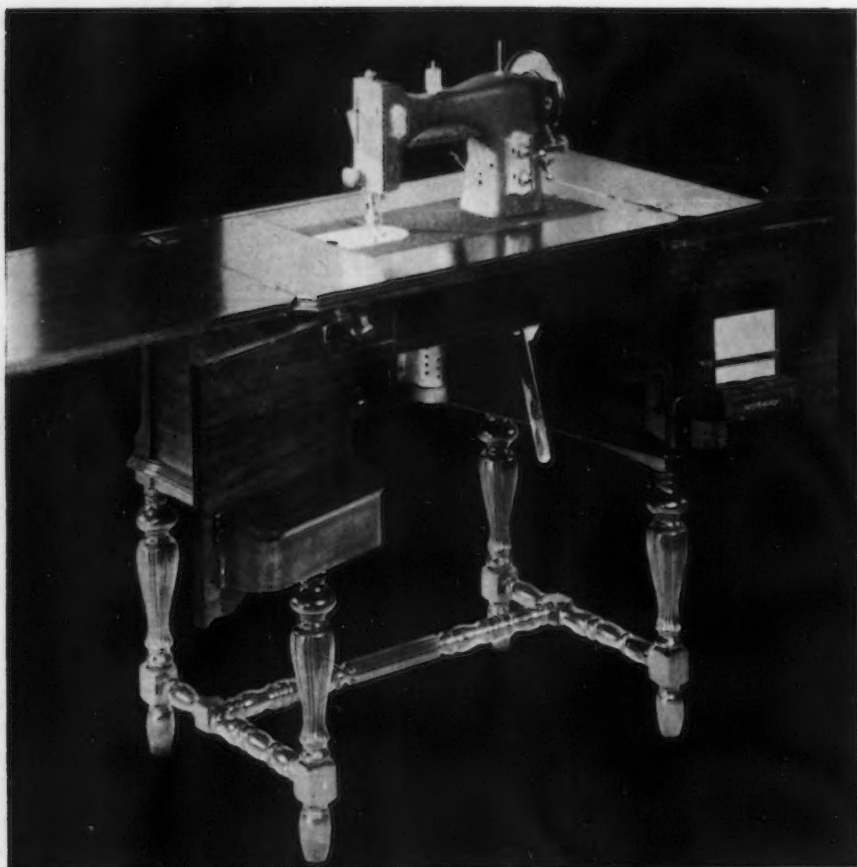
The third reason is more or less a political one. It is the undoubted realization of the Administration that whatever may have caused victory in the last election, the next one will depend upon a substantial business recovery. Thus, for the next two years, the interests of the Administration and the interests of sound and progressive business will coincide.

If business and industry do not capitalize this splendid opportunity for demonstrating their public worth, they will deserve whatever fate may lie in store for them, whether it be State Socialism, Communism or Fascism. Already, however, there are plenty of indications that they will live up to their large responsibilities.

Our business leaders are already hard at work, shaping a program of action which gives promise of the attainment of recovery plus the achievement of reforms to which no well intentioned man can take exception. We are not going back to a wholesale acceptance of pre-depression ideas and ideals; we are going to reject those that were bad, cleave to those that were good and inaugurate some that are better.

In the meantime, business is "on the spot" in the sense that the public, political and private, looks to it for leadership and action. We cannot all of us provide the leadership, but all of us can help provide action. We can do this by forgetting the depression, taking fresh hold of courage and enthusiasm and striving with all our might to make our own businesses bigger and better.





Modern

THIS article illustrates and describes some of the methods followed at the plant of the White Sewing Machine Co., Cleveland. This company has been making sewing machines for 59 years and thus its methods are the result of long practice, together with the adoption of innovations from time to time. Sewing machines must present an attractive appearance to the prospective purchaser; thus all polishing operations must be conducted with care. As production costs must be carefully considered in the production of any unit to be sold on a competitive basis, the polishing costs, of course, must be kept at normal. The company's output is approximately 60,000 machines annually, each machine having 40 polished parts. Thus a total of about 2,500,000 separate parts are polished annually. Eighteen polishing and buffing lathes are in operation, and to keep the operators supplied with suitable wheels a stock of approximately 500 is carried at all times, set up ready for use.

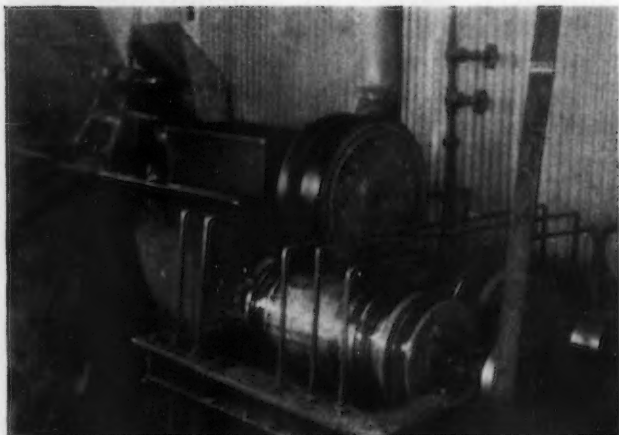


FIG. 1—Removing old "heads" by washing.



FIG. 2—"Setting up" the wheels

UNTIL recent years polishing often was looked upon as a necessary evil to be carried out as cheaply as possible by rule of thumb methods. Thus every individual polisher had his own theories which he put into practice often to the detriment of efficient production. Intensive production methods instituted during the past fifteen years or so have invaded the polishing room so that today in progressive plants the old art of polishing is receiving considerable attention.

Considered in the abstract, polishing is a simple operation consisting of removing scratches and bringing out a suitable luster by putting the parts over successive wheels coated

Polishing on a Production Basis

By FRED B. JACOBS

with various grits of abrasives. From a practical point of view, however, each individual operation must be considered separately and this is one reason why polishing room practice varies greatly, even in shops in the same locality.

Economy in any polishing operation depends in a large measure on the care exercised in setting up the wheels with glue and emery. If the wheel head has been damaged so that it is broken in places the wheel must be washed to remove the old head. This operation is performed as shown in Fig. 1. This is a so-called roller type washer designed by the White company's engineers. It consists of two cast iron rollers driven by a single overhead belt at a speed of 90 r.p.m. As Fig. 1 shows, the rollers are partly immersed in water while rails are provided to keep the wheel in place on the roller faces. As the rollers rotate water is conveyed to the wheel face. This softens the old head so that it can be removed readily. The moisture does not penetrate the wheel as the centrifugal force throws it off constantly. If, however, the wheel head has not been injured all that is necessary is to clean it with any grease solvent, such as gasoline, after which it is ready for setting up. The only difference between heading up and setting up a wheel is that the first operation consists of applying successive coats of glue and abrasive, while setting up calls for one or perhaps two coats only.

The glue used at the plant in question is a first run hide product supplied especially for setting up wheels. Due to the fact that old glue loses its holding power rapidly, only enough to last a few hours is made at a time. The glue is heated in a special heater provided for this purpose with provision for keeping the temperature at a point not to exceed 150 deg. Fahr. In setting up fine grit wheels a somewhat lighter mixture is employed than used for coarse grits. In general, however, the mixture is what

FIG. 3 — Balancing device for polishing wheels.



FIG. 4—Part of the wheel stock.



FIG. 5 — Hand hole cover plates.





FIG. 6 — Polishing fixtures for plates.

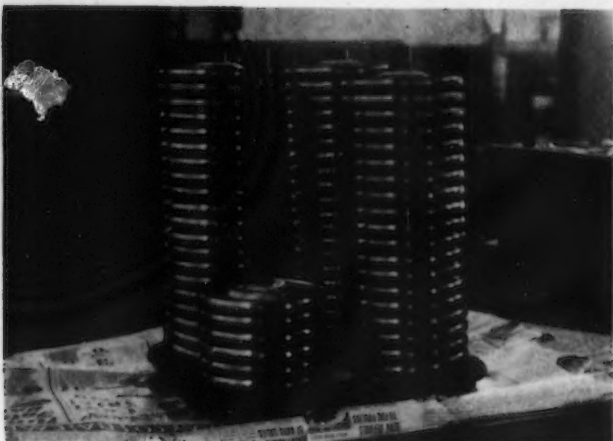


FIG. 7 — Die cast hand wheels and racks.



FIG. 8 — Polishing the hand wheels.

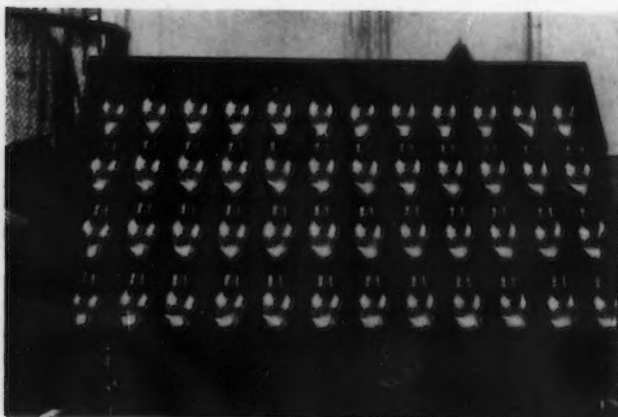


FIG. 9 — Electric light shades.

is called two to one, that is two parts water (by weight) to one part glue. For fine grits, the mixture is diluted.

Setting up of the wheels is done by one man only. As shown in Fig. 2, the wheel is coated with glue and then rolled in the abrasive, different grits being kept in covered wood troughs to exclude dust. This is important, for a few particles of foreign matter might leave deep scratches which would necessitate repolishing to remove them.

Each polisher balances his own wheels just before he mounts them for use. This is done on level balancing ways as shown in Fig. 3. If in this test the wheel shows out of balance, lead is nailed on the light side of the wheel to compensate for the heavy side. This is a cut and try operation, but an experienced man can approximate the amount of lead necessary within close limits.

Part of the wheel stock is shown in Fig. 4. The wheels vary from 6 to 14 in. in diameter and from $\frac{1}{2}$ to 9 in. face. Some are wood, leather faced, others are felt, and others built up of muslin buff sections glued together under pressure. Many of these wheels have formed faces to fit the work. The wheel shown in the lower foreground is 12 in. in diameter, 9 in. face, of wood with leather face. These wheels are made at the White plant from clear grain pine in $\frac{1}{2}$ in. sections with the grain of each alternate section running at right angles. The leather facing comes together with a butt joint, while the leather is held securely in place on the wheel by gluing and pegging.

The parts shown in Fig. 5 are hand hole cover plates. During the various polishing processes the parts are stored in the type of box container shown which holds 108 pieces. The use of such a container keeps the plates from getting scratched. Referring to the part resting on its edge, the three spots are the result of electric welding. The object of polishing the parts is to remove these marks and to finish the entire surface ready for plating. The polishing operation is shown in Fig. 6. Here it is shown that the operator holds the piece in a wood fixture which is hinged and provided with two handles. When the handles are brought together with slight pressure the piece is gripped firmly. The wheels used for polishing are wood, leather faced, and all wheels are operated at a surface speed of 7500 ft. per min. First the pieces are put over a wheel set up with No. 140 manufactured alumina. Then come two greasing operations one after another over wheels set up with

No. 180 emery. The second wheel is one that has been worn comparatively smooth in the first operation. Last the parts are put over a greased wheel set up with FF emery. After the parts are nickel plated they are buffed with white buffing compound. Then they are chrome plated.

The parts shown in Fig. 7 are hand-wheels. Formerly these were made of cast iron, but die castings have been substituted. The object of the pile rack on which the parts are placed is to prevent scratching the highly finished surfaces. This rack will conveniently hold 80 wheels. It is a cast iron base with four uprights made of ordinary iron pipe screwed in place.

The polishing operation is shown in Fig. 8. The operator holds the wheel over an arbor and by bringing it at an angle against the wheel, the face of which is grooved slightly, the action of the polishing wheel causes the hand wheel to turn. Thus it is polished readily and evenly. The polishing wheel is hard felt. The first operation consists of cutting down with No. 140 manufactured abrasive. This is done on a greased wheel. Then a similar operation on a greased wheel set up with No. 180 emery follows. Next the parts are buffed with white compound, after which they are ready for nickel and chrome plating.

The parts shown in the box in Fig. 9 are electric light shades as used on sewing machines. This receptacle is made to hold 48 parts. These shades are made of sheet brass. After they are blanked out in a punch press they are cut down with tripoli and then buffed with rouge on a loose muslin wheel. The object of this operation is to make very smooth surfaces so that the metal will "flow" readily when placed between the forming dies. After the parts are formed they are polished on the outside with a muslin wheel set up with No. 180 emery. Then they are again buffed with rouge to bring out the luster. The inside also is buffed. This is a somewhat difficult operation performed on a soft wheel of small diameter that conforms to the inside contour. In this operation the axis of the wheel is square with the work instead of parallel. In other words, the work is pressed against the side of the wheel. The parts then are nickel and chrome plated.

The work rack shown in Fig. 10 is made to hold 50 sewing machine shuttles. It is very simple, as it is only a board with 50 bored holes, deep enough to hold the shuttles so that they do not project above the surface. Thus several boards can be

FIG. 10—Work rack for shuttles.

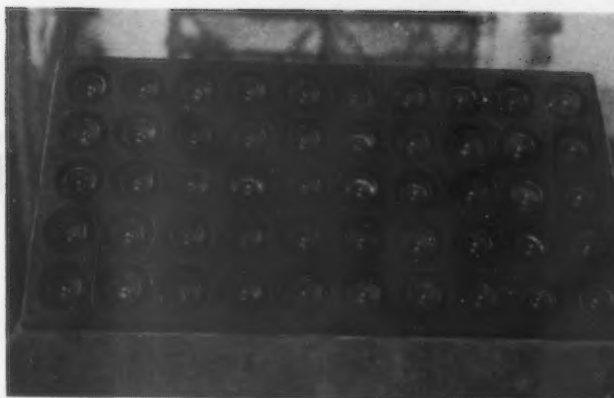


FIG. 11—Polishing curved shuttle face.



FIG. 12—Polishing shuttle point.



stacked one above another. Over 14 separate polishing operations are involved in polishing the shuttles, many of them being performed on formed wheels. The operator in Fig. 11 is polishing the curve shuttle face on a formed wheel, the shuttle being located on a holder. Several wheels are used, set up with No. 54 and 120 manufactured alumina and No. 140 emery. The latter wheel is greased. Then the shuttles are put over a similar wheel that has been worn smooth on the first operation with the No. 140 grit. Fig. 12 shows how the under

surface of the shuttle point is polished, the wheel face being undercut to accommodate the work.

Many small parts are polished by tumbling with steel balls with water and soap compound. If this operation is carried out properly the resulting parts present even surfaces for plating. The value of this method is readily apparent, for if these small parts were hand polished the cost would be prohibitive. After tumbling until a satisfactory polish results, the parts are thoroughly cleaned and dried by tumbling them in sawdust.

Welding in Reinforced Chair

BEFORE discussing the welding procedure, it will be worth while to learn how these chairs are constructed. They are made partly of steel and partly of wood, the different parts being so combined as to reinforce each other. That is, the posts, backs and seats are of wood. The stretchers, rails and seat bracing are of 18 gage steel. The stretchers are $\frac{3}{4}$ in. steel channels, and the steel boxing under the seats is of 2 in. angle iron. The vertical steel supports are of 1 in. angle iron. The steel members are assembled separately as shown in Fig. 1 and then combined later with the wooden parts as shown in Fig. 2. These illustrations show in detail how these chairs are constructed.

The history of how these chairs came to be made and the essential part played by welding is very interesting and illustrates forcibly how the progress and prosperity of a manufacturer depends on his keeping up to date in all branches of his management technique. For instance the plant of the Allen Chair Co. is

THE Allen Chair Co. of West Concord, Mass., makes, among other things, steel reinforced chairs for use in restaurants, schools and other places where the service is severe. The steel parts are joined together by 72 spot welds. Tests have shown them to possess great strength. Furthermore, the cost of these chairs is much less with welding than it would be with other methods of construction, not to mention the superior appearance and greater strength.

actually a wood-working shop and to go there to secure material for an article on welding seemed most decidedly anomalous. The fact of the matter is that this company has been trying to expand its market. With setup chairs the limits of competition were Pennsylvania, New York and New England because of freight rates. Consequently a knockdown chair was developed and patented in 1930. A

good deal of development was still necessary and it was not until October, 1931, that the present type of chair was placed in production, after more than a year of experimenting and testing.

The steel frame is standard, but the wooden parts can be greatly varied to meet different specifications for design and decorative schemes. The result is that a custom-made chair is produced. They can also be shipped in parts and assembled at destination, with a corresponding reduction in freight charges and wider area of distribution.

Spot welding has made this type of chair with the desired characteristics possible. The steel parts were first held together in the experimental models by means of bolts. Then rivets were tried. With both of these the appearance was not what it should be, the cost was high and the steel stock too heavy and expensive. By employing the spot welding method of fabrication lighter steel could be used and the process reduced in cost. In addition to this, and of equal if not

Fig. 1—Stretchers, rails and seat bracing are of 18 ga. steel.

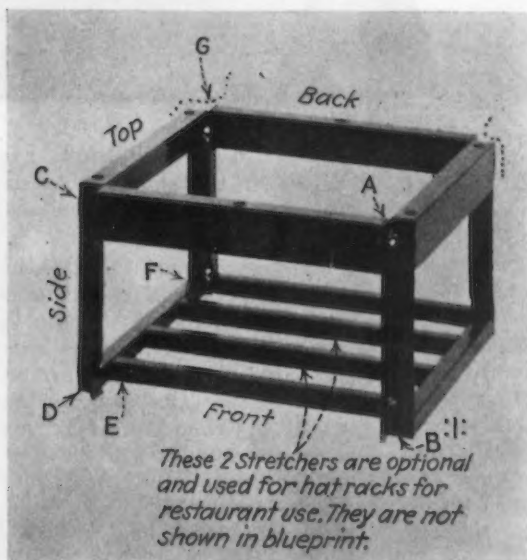
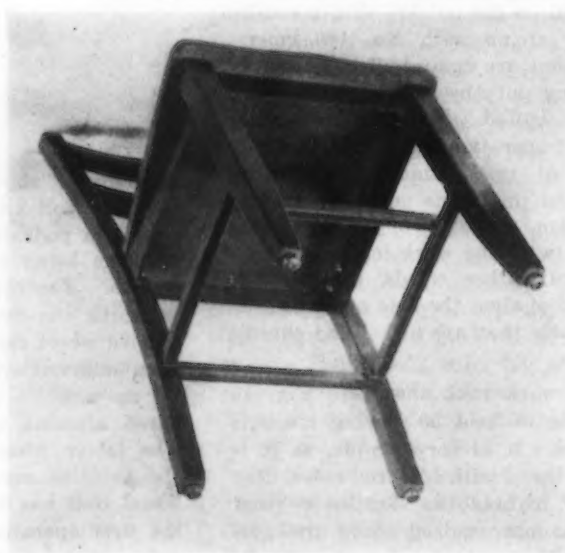


Fig. 2—Assembled chair, showing wood parts attached.



Construction

By FRANCIS A. WESTBROOK

greater importance, is the fact that the welded construction maintains its rigidity much better than is possible with bolts or rivets.

From this it will be seen that the merchandising policy and the introduction of a new product is in reality in this case dependent on making use of the latest type of welding machinery.

Returning now to the discussion of the welding procedure, it will be noted from Fig. 1 that the four top pieces of the steel frame are exactly the same size. This is a bit of standardization which has helped to simplify operations and keep costs down. The ends of each of these four pieces has five welds. That is there are 10 welds per corner and 40 welds for the top frame.

The stretchers, as already stated, consist of $\frac{3}{4}$ in. channels. Each end is bent in with two flanges. Each flange has two spot welds, so that there are four welds on the ends of each stretcher. In other words there are eight spot welds per stretcher, or 32 for four stretchers. If there are two extra stretchers for a hat rack there will be 16 more welds. The two

front vertical pieces are also similar to each other, as are the two back vertical pieces but the latter are curved as shown in Fig. 2 so that they are not interchangeable with the front pieces.

The spot welding machines used are those made by the Federal Machine & Welder Co., of Warren, Ohio. The

parts to be assembled are first placed in a special jig as shown in Fig. 3. The jig itself, without the parts in it, is shown in Fig. 4. The welding operation in progress is shown in Fig. 5. Experienced welders are able to average 10 frames per hour including placing the parts in the jig and doing the welding except the front stretcher

Fig. 3—Jig for welding steel parts, with work inserted.

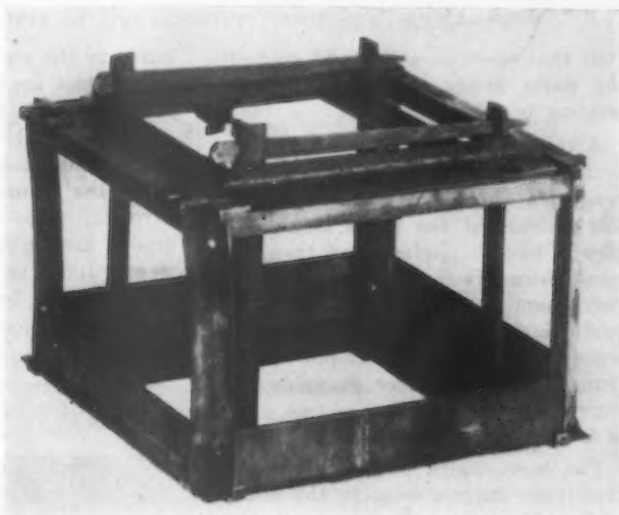
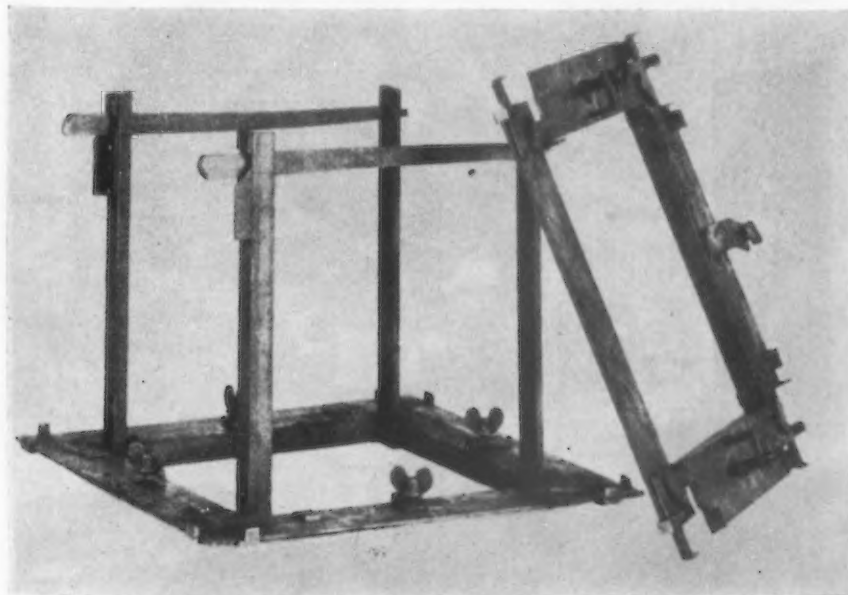


Fig. 4—The welding jig is of simple form.



which is put in later. The time is about equally divided between placing the parts in the jig and doing the spot welding. This rate of production is without the use of a helper for the welder. The front stretcher has to be put in later because it would be in the way of the earlier operations.

There are 64 welds in the first operation and eight in placing the front stretcher. It requires about 2 sec. for each weld. The machine has a special set of jaws for this work which makes it possible to reach all of the points necessary to weld. The speed is set for the fastest operation. The steel used is hot rolled, pickled and oil cooled.

The pieces are placed in the special jig shown in the illustrations in the following order: side pieces, corners and then the other parts. They are all locked in place by two wedge



AT LEFT
Fig. 5—Welding the
steel parts in jig.

BELOW
Fig. 6—The finished
product has a pleas-
ing appearance.

rods that serve as a key and hold all the parts firmly together while the welding is being done.

After welding the frames are gone over by hand to see that there are no rough places or burrs left on the steel. The outside of the welds is filed to give a smooth surface and then the whole frame is dipped in opaque lacquer enamel. The material used is a particularly tough air drying lacquer enamel. Only one coat is put on the frames at first. After assembly the entire chair is given one or two coats of transparent wood lacquer.

The new chairs have met with a gratifying success even in the midst of the depression. For instance 500 have been purchased for a reformatory for boys in Rhode Island, they have been installed in a number of public and private schools and they are in use in some restaurants in Boston. One of the illustrations, Fig. 6, shows them in service in one of the Alpha restaurants in that city.

This type of construction lends itself particularly well to restaurant use and other places where the scheme of decorations is changed every once in a while. Not only can seats with a different colored upholstery or leather be changed very easily but backs or front legs of an entirely different design can be installed on the job. In this way a restaurant may secure the effect of new furnishings by making the chairs harmonize with any new scheme of decoration at a very reasonable cost.

The method of attaching the wooden

parts to the steel frame is very simple. They are held by screws with special threads to increase their holding power and in addition there is a slight countersunk cavity just underneath the frame where the screws go through. This means that when the screws are tightened the metal frame is put under tension which keeps the screws from loosening. To change the back it is only necessary to remove four screws and replace them in the new back.

From the foregoing it will be seen how welding has made it possible for a wooden chair manufacturer to extend his market, meet competition and stimulate his sales at a time of the worst business depression which the country has experienced in many decades. While this is a specific application of welding it is very significant and suggestive as to what can be done and what may be expected in the future in almost any line of manufacture.



Business Men's PROSPERITY SURVEY

HERE'S a chance to give voice to your own ideas as to which national policies you believe most likely to speed recovery in your line of business.

BALLOTS like this are being published this month in many business papers affiliated with The Associated Business Papers, Inc.—reaching virtually all key men in every line of industry, trade and profession throughout the nation.

BUSINESS men, nationally, may appreciate an opportunity to express their convictions to a strictly non-partisan and impartial body—with the assurance that by so doing, business views will be presented effectively to the political, banking, industrial, business and labor leaders of the country.

QUESTIONS on the economic ballot below are prefaced with "In your line of business" to make possible an industry by industry study as well as a consensus of business opinion in all fields of industry—so let our industry be well represented in the responses.

ECONOMIC BALLOT

Check your convictions, sign, clip and mail this ballot.

1. As regards the possibility of Congress adopting a universal thirty-hour work week, do you favor such legislation? Yes () No (); and if so on the basis of () continuation of existing weekly wages, or () continuation of existing hourly rates of pay.
2. In your line of business are you satisfied with enforcement of maximum hours and minimum wage provisions now in effect? Yes () No ()
3. In your line of business is there obtainable ample **working** capital—from banks? Yes () No (); from government agencies? Yes () No ()
4. In your line of business is there obtainable ample **investment** capital—from banks? Yes () No (); from government agencies? Yes () No ()
5. In your line of business do you favor limitation of industrial output—by government control? Yes () No (); by industry control? Yes () No ()
6. In your line of business do you favor a plan for control of prices—by a code provision establishing price fixing? Yes () No (); by a code provision establishing an open price plan? Yes () No ()
7. In your line of business do you think that government measures now in effect are **helping** small and medium sized enterprises? Yes () No (); hurting such enterprises? Yes () No ()

Signed

Firm

Business

Please return this ballot to
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William S. Knudsen, executive vice-president of General Motors, whose views on foreman responsibility and training are outlined in this article. ▲ ▲ ▲

THE brief, pointed comment by Mr. Knudsen, which is quoted on this page, is an excellent summary of what General Motors thinks the foreman's place is today. If in previous years the foreman has been regarded as the key man in industry, he is now more than ever the key man. As the management's representative closest to the rank and file of workers, his responsibilities have increased rather than diminished since American industry started to operate under NRA.

Management is not only conscious of the new relationship with labor which has been developing in recent years, but also is accepting it voluntarily as a means of promoting the best interests of all parties concerned. The recent statement of General Motors regarding its relations with factory employees is a shining example of management's new point of view. Said this statement, "This relationship requires a harmonious working together to the end that the quality and cost of the product may be such that the business will prove continually successful and will survive. The management of General Motors is conscious of the fact that it cannot get along without labor any more than labor can get along without management. Both are in the same business and the success of that business is vital to all concerned."

Because the top management is convinced of the rightness of a policy doesn't necessarily insure its acceptance by executives all down the line, especially in a large organization. And it is just as vital that the minor executives directly in command of workers in the shop have the proper point of view as that the management itself, considerably removed from intimate contact with the men in individual plants, be aware of it. To function efficiently an organization must be so set up that every executive, from the bottom to the top, is thinking in the same terms as every other executive. To accomplish this desirable aim, General Motors is giving special training to more than 5000 foremen in its manufacturing plants.

This training is chiefly in the science of industrial relations, especially as it pertains to closer cooperation of the foremen with their men. From the courses, which originated in General Motors Institute at Flint, foremen get a deeper appreciation of the guiding impulses of human behavior on one hand and of the broad phases of industrial economics on the other. The instruction is intended to define the position of the foreman under collective bargaining rights that employees now have with management as well as to make foremen

more responsive in relaying ideas up or down through the plant organization.

Specifically, the aims and operation of employee representation are analyzed from the viewpoints of the worker. Differences in individual desires and incentives are studied. Ways and means of reaching a better understanding are discussed to insure improved supervision policies. Cooperative methods, the judging of men, group morale and transmission of orders receive special attention. Corporation organization, planning, control of materials and waste, equipment handling and the science of personnel work are studied so that the foremen will appreciate some of management's problems.

A Clearing House for Ideas

"In reality, this training is a clearing house of ideas, policies and experience," said Major Albert Sobey, director of the institute. "Here opinion is crystallized in order to arrive at coordinated thinking on the latest phases of industrial relations."

Foremen who are conveniently near Flint attend conferences at the institute. In remote centers, faculty members visit the plants and lead the conferences there. In some cases the meetings are directed by members of the plant organization who have re-

Today's

By BURNHAM FINNEY
Detroit Editor, THE IRON AGE

Foremen Are Bigger Men

ceived special training at the institute. All sessions are limited to 25 men so that personal questions and problems can be analyzed. Standardized text sheets written especially for this study are used. General discussion helps to clarify perplexing situations presented during every conference. The courses were first conceived seven years ago by the institute, but the current training is far more extensive and widely attended than any previously offered.

Mr. Knudsen is convinced that the foreman's job is more difficult today than it ever has been, because it is more technical. Manufacturing processes are more complicated and there is more trouble in handling help. Outlining his views regarding the responsibilities and duties of foremen, Mr. Knudsen says:

"My first principle is that there should be no 'working foremen.' A man is either a foreman or a workman. Group leaders should be abolished. The second principle is that there should be some reasonable ratio

SPEAKING before a group of industrial executives, mostly foremen, in Flint, Mich., early this year, William S. Knudsen, executive vice-president of General Motors Corp., made the following statement: "Somebody has said that if you are a foreman nowadays, management is on one side, labor is on the other side, and the foreman is in the middle. Now I should like to tell you just as earnestly as I know how that the foreman is not in the middle. If he is in the middle, that is going to be just too bad. The foreman is out in front and must be out in front a good deal more than he ever was."

between the number of workers and foremen. I believe the ratio should be about 20 workmen to a foreman.

"The foreman has two major duties. The first is his duty to the

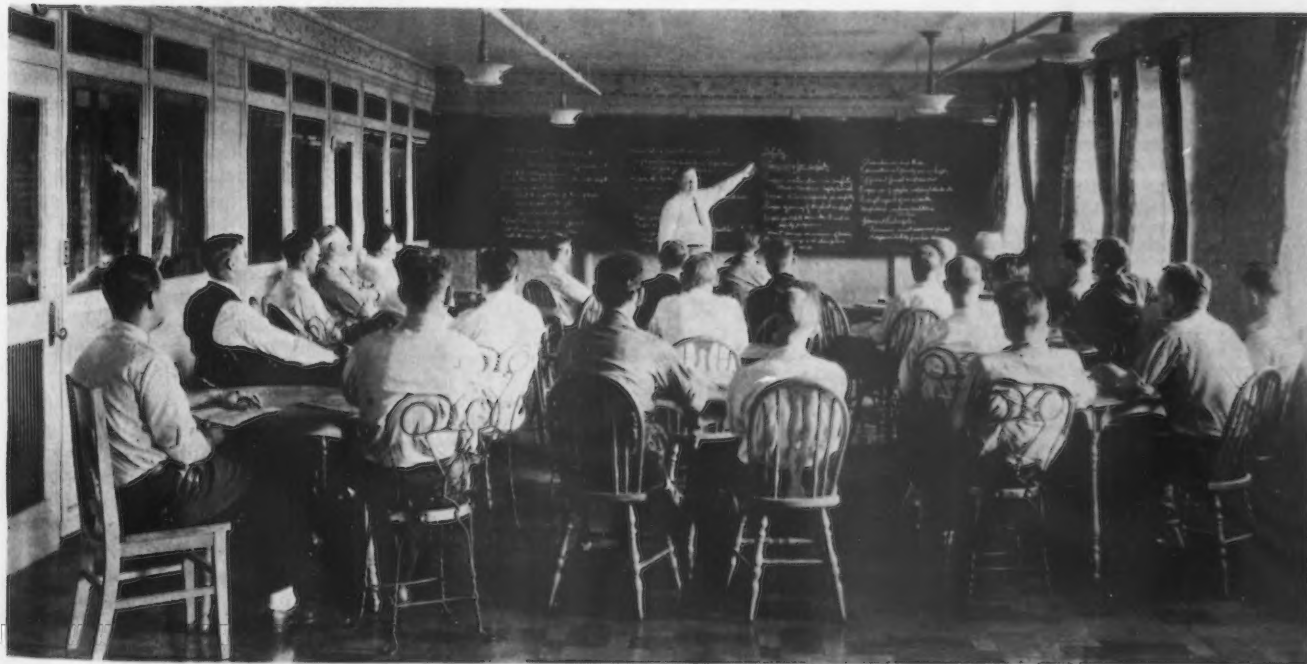
article being made, and the second is his duty to his men. The second is the more important of the two.

"At times we have had to choose between a man of high ability, technically, and a man with somewhat less technical ability but more able to handle help, which in itself is an art. In the latter case he must have sufficient knowledge to be fully conversant with the quality and what is a reasonable quantity to be expected. Above all, he must be a man.

Foremen Must Know Their Men

"We must have foremen who fully understand their position so that when men are fired they have good reasons and the men must stay fired. The foremen must know their men; there can be no question about this. I believe in the old saying, 'An army is as good as its non-commissioned officers.'

"I believe there should be one man to give the foreman orders. This does not mean that we cannot give him information, instruction or sugges-



Today's problems call for bigger and better foremen and this, in turn, demands systematic training and education in policies as well as methods.

tions, but there should be a definite person to give him orders. This relates not only to his materials, but to his tools, quality, costs and safety. Definite lines of authority should be established, so the foreman will know what he is expected to do and can properly represent his men.

"The class of work has much to do with the way to train foremen. The foreman should know exactly what the requirements for quality are and should be furnished with the proper

drawings to check his memory whenever he desires. He is also responsible for quantity, and should be told what is expected of him. There is no value in boosting the quantity or discounting the requirements to a foreman.

"The personnel department has the responsibility of filling requisitions made by the foreman for men. If the human material out at the gate is not what the foreman wants, I am in favor of giving all possible leeway to

get him the type of men he needs. In those plants where we have had the best foreman control, there has been the least labor trouble. And, first of all, the personnel department should have a good, up-to-date file of the inefficient and shiftless, so that even in times of shortage we do not get these men back in the plants.

"I feel that we are not getting a new deal in industry but that we are going back to the old deal in industry which existed previous to the extremely rapid development of industry subsequent to the war. I refer to the shop management which dealt with men in great masses right after the war rather than with the department.

"I refer to the practice which gradually left the foreman with a gang of men with only the privilege of being called down for something, but with most of his duties crisscrossed by organization lines of other kinds. He couldn't hire his men, sometimes he couldn't fire them. Most of the time he had little to do with the planning of the job he had in charge, and often the tools were never inspected by him until the job was set up.

"The industrial science I look forward to will be the relationship that we establish on the basis of cooperation between the men and the foremen. Here is our problem and it should be our problem for years to come. The biggest thing before industry is to get better management out of all departments, and through cooperative methods give more and better work so that the public's interest in our product can be retained and our future assured."

The 1935 convention of the American Ceramic Society will be held in Buffalo, Feb. 17 to 23. Headquarters of the convention will be at the Hotel Statler, where all sessions will be held. In connection with the meeting, plans have been made for holding an exhibit of "Made in New York State" ceramic products and also the showing of a series of educational process exhibits, both of which will be of general interest to the public as well as to the ceramists.

A railroad line constructed of welded rails is now being tested by the German State Railway. There are almost no joints over the entire division where the test is being made. An express train, without passengers, will be driven over this division until a mileage of about 63,000 is obtained. The speed of the train will vary from 75 to 95 miles per hour. If the welded rails stand up under high speeds they will be introduced on all express lines in Germany.

GENERAL MOTORS EXECUTIVE TRAINING PROGRAM OUTLINE OF PRINTED MATERIAL

SECTION-A-MANAGEMENT AND THE EXECUTIVE JOB.

- 1-THE PLACE OF MANAGEMENT IN MODERN INDUSTRY
- 2-PRINCIPLES OF EFFICIENT ORGANIZATION.
- 3-ANALYSIS OF THE EXECUTIVE JOB.

SECTION-B-PLANNING.

- 1-PLANNING IN AN INDUSTRIAL ENTERPRISE
- 2-PLANNING IN THE DEPARTMENT.
- 3-THE DEVELOPMENT OF PLANNING ABILITY.

SECTION-C-QUALITY CONTROL AND WASTE ELIMINATION.

- 1-THE CONTROL OF QUALITY
- 2-THE CONTROL OF SCRAP.
- 3-THE CONTROL OF WASTE
- 4-WHAT IS INSPECTION?
- 5-THE INSPECTION AND SALVAGE DEPARTMENTS.

SECTION-D-EQUIPMENT.

- 1-THE FUNDAMENTALS OF EQUIPMENT CONTROL.
- 2-TOOL CONTROL.
- 3-THE TOOL AND MAINTENANCE DEPARTMENTS.

SECTION-E-BUILDING AND MAINTAINING THE ORGANIZATION.

- 1-BUILDING THE DEPARTMENT ORGANIZATION.
- 2-THE PERSONNEL DEPARTMENT.
- 3-THE CONTROL OF LABOR TURNOVER
- 4-PROPER SUPERVISION.

SECTION-F-PRINCIPLES OF HANDLING MEN

- 1-PERSONNEL RELATIONS IN INDUSTRY-HISTORICAL EVOLUTION.
- 2-DEALING WITH MEN-INDIVIDUAL DIFFERENCES.
- 3-DEALING WITH MEN-HUMAN MOTIVES AND DESIRES.
- 4-DEALING WITH MEN-INFLUENCE OF THE GROUP.
- 5-DEALING WITH MEN-PROBLEMS IN HUMAN BEHAVIOR.
- 6-DEALING WITH MEN-INTELLIGENCE AND TRAINING.
- 7-HANDLING MEN-GETTING ALONG WITH PEOPLE.
- 8-HANDLING MEN-DIFFICULTIES WITH SUBORDINATES.
- 9-HANDLING MEN-GIVING AND RECEIVING ORDERS.
- 10-INCENTIVES-EMPLOYEE MORALE AND MORALE CONTROL.
- 11-SECURING CO-OPERATION.
- 12-JUDGING AND RATING MEN.

SECTION-G-EMPLOYEE RELATIONS.

- 1-THE BACKGROUND OF EMPLOYEE REPRESENTATION.
- 2-TYPES AND OBJECTIVES OF EMPLOYEE REPRESENTATION.
- 3-RESULTS OBTAINED WITH EMPLOYEE REPRESENTATION PLANS.
- 4-PLANS OF EMPLOYEE REPRESENTATION IN GENERAL MOTORS.
- 5-THE EXECUTIVE'S RELATIONSHIP IN EMPLOYEE REPRESENTATION PLANS.

Above is the outline of printed material used in connection with the executive training program of General Motors Corp. The program is not intended as a hard and fast outline to which foremen groups should adhere without variation. Instead it is considered more as a guide to the subjects which foremen should study in order to secure a better understanding of their jobs, of their relationship to management and labor, and of the mechanics of employee representation.

SECTION-H-INCENTIVES.

- 1-WAGES.
- 2-THE RELATION OF THE EXECUTIVE TO WAGE QUESTIONS.

SECTION-I-POLICIES.

- 1-THE EXECUTIVE AND COMPANY POLICIES.

SECTION-J-SAFETY.

- 1-THE SAFETY PROGRAM.
- 2-THE PROBLEM OF WORKMEN'S COMPENSATION.

SECTION-K-JOB STUDY.

- 1-THE METHODS OF WORK DEPARTMENT
- 2-PRINCIPLES OF JOB STUDY.
- 3-TIME AND MOTION STUDY.

SECTION-L-TRAINING.

- 1-THE PROBLEM OF TRAINING IN INDUSTRY.
- 2-TRAINING AND THE DEPARTMENT.
- 3-METHODS OF APPLYING TRAINING.

SECTION-M-HOUSEKEEPING.

- 1-INDUSTRIAL HOUSEKEEPING.

SECTION-N-FUNDAMENTALS OF ECONOMICS

- 1-DEVELOPMENT OF ECONOMIC ORGANIZATION.
- 2-MODERN ECONOMIC ORGANIZATION.
- 3-ELEMENTS OF ECONOMICS.

SECTION-O-FINANCIAL ORGANIZATION AND CONTROL OF BUSINESS.

- 1-INVESTED CAPITAL.
- 2-BORROWED CAPITAL.
- 3-FINANCIAL ANALYSIS.

SECTION-P-BUDGETS.

- 1-BUSINESS CONDITIONS.
- 2-FORECASTING.
- 3-DEPARTMENTAL BUDGETS.

SECTION-Q-DEPARTMENTAL COST CONTROL METHODS.

- 1-DEPARTMENTAL COST REPORTS.
- 2-DIRECT MATERIALS COST.
- 3-DIRECT LABOR COST.
- 4-DEPARTMENTAL EXPENSES.
- 5-GENERAL OVERHEAD.

SECTION-R-PERSONAL CHARACTERISTICS.

- 1-PERSONAL ANALYSIS.

SECTION-S-GENERAL.

- 1-THE REQUIREMENTS OF MODERN INDUSTRIAL LEADERSHIP.

When and How to Train Welders

By C. D. MOORE

Supervisor of Trades Training
Westinghouse Electric & Mfg. Co.

THE question is often asked, "When should we train welders?"

Well the answer is the same as in all other training programs, and like the others, the proper procedure is seldom followed in deciding when to train workers.

Much time and expense caused by defective work and delayed marketing of the product could be saved if the same foresight were used in foretelling our personal needs as in the development of the product. The engineer may carry on his research or development work for several years and when a satisfactory conclusion has been reached and a major change to welded fabrication is to be made we suddenly discover we have no men capable of doing welding work. After exhausting every effort to hire welders through the regular employment department we decide to train men for this work in our own welding school.

The school should be located in a well-ventilated building and the instruction should be given under the supervision of an expert welder. The size of the school will depend, of course, upon the number of welders needed, but in any case one instructor should not have more than 12 to 15 men.

There are a number of things that should be studied carefully by the manufacturer before establishing a welding school. First, make sure that good welders are not available from other sources. Second, is the work of a general nature or highly specialized? Third, how many different classifications of welding will there be?

In the first place, there may be a welding school already established in the vicinity that could supply the need for welders. Such an independent school should be carefully investigated, however, to assure that it is equipped to give practical training, as well as valuable information from an engineering point of view. In the second place, if the work is very highly specialized, most of the training will be carried on in the shop on the job itself and only the preliminary training will be given in the school. This will have a bearing on the program established and the size of the school. In the third place, the number of classifications determine the extent of the training schedule. If there are very few divisions of the work perhaps a general schedule will be sufficient, but if the classifications are many then the schedule must be arranged so that it not only provides general training, but will also cover

any specialized job that the men may be expected to do. In any case the schedule will have to be devised so that part of the training will be given in the shop after the man has completed the school course.

Procedure Followed by Westinghouse

The next question is "How to train." At East Pittsburgh the students are given a lecture on safety before receiving instruction of any kind. In this they are warned especially against the danger of exposing the eyes or skin to the arc rays. They are then instructed in the operation and care of the different types of welding equipment and tools which they will be required to use during their instruction period in the school and also when they go into the shop as regular welders. Each student is given a hand shield and placed in a booth with one of the advanced students so that he may observe and get

(Continued on Page 76)

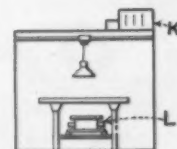


Fig. 2—Front view of welding booth. K shows the resistance, and L the reacting coil.

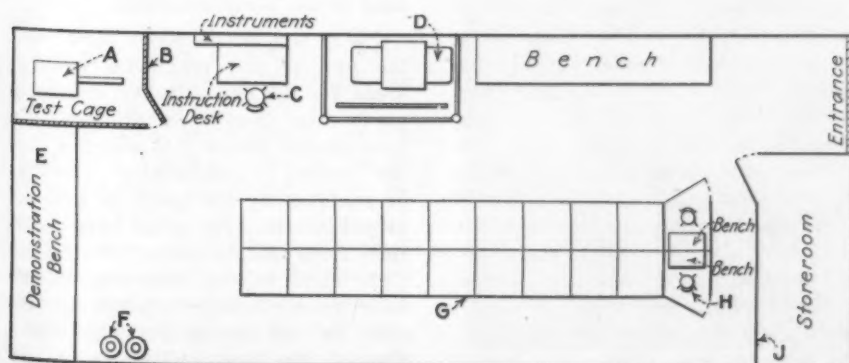


Fig. 1—Layout of welding school. Reading from left to right, the various units of equipment are: A, testing machine; B and J, expanded-metal cages; C, instructor's desk and chair; D, multiple-operator arc welding outfit; E, demonstration bench; F, gas tanks; and G, welding booths made of sheet metal and measuring 6 x 6 ft. x 6 ft. high. Ten of the booths are connected to the multiple-operator machine, D, the others having single-operator sets which may be mounted overhead or on the wall back of the booth. Benches and chairs (H) are located at the end of the line of booths, as shown.

Workplace Layouts That Save

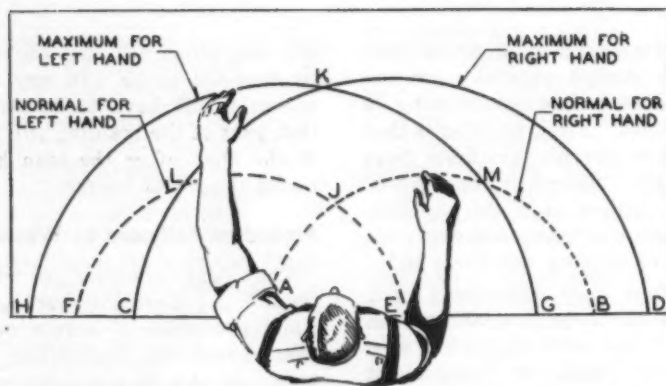


Fig. 1—Normal and maximum working areas for the hands in the horizontal plane.

THE improvement of the layout of the workplace of the industrial worker is too often overlooked as a means for effecting operating economies. The layout of the workplace partly determines the method the operator must follow in doing a given task, and it almost wholly determines the motions he must employ. Since certain motions are more fatiguing and consume more time than others, it is quite possible to effect worthwhile cost reductions merely by rearranging layouts. Before the rearrangements can be made, however, it will be necessary to consider what motions the human body can make and which motions are the most efficient. When this is thoroughly understood, it will be a relatively simple matter to make good set-ups on any kind of work.

The efficiencies which have been effected by the use of the so-called circular workplace are fairly widely known. The feeling seems to exist, however, that the principles of the circular workplace can be applied only to layouts for repetitive hand operations. As a matter of fact, the underlying principles can be applied

to nearly all classes of work to good advantage.

Classification of Motions

Two general concepts underlie workplace layouts. The first has to do with the classes of motions that a human being can make. There are five general classes as follows:

1. Finger motions.
2. Finger and wrist motions.
3. Finger, wrist and forearm motions.
4. Finger, wrist, forearm and upper arm motions.
5. Finger, wrist, forearm, upper arm and body motions.

It is usually stated that motions of the lower classes can be made more quickly and with a lesser expenditure of effort than motions of the higher classes. This, however, is true only when the motions are made under not greater than normal load over paths of approximately equal length. It might be possible by exerting a prodigious effort to lift a heavy object an inch or so with a finger movement, but the same object could be lifted the same distance in less time, and with far less fatigue by a finger,

wrist and forearm movement. Similarly, it may be seen that a short fourth class motion can be made more quickly than a long third class motion.

In applying the concept of motion classes to actual layouts, the attempt should be made to reduce all motions to the lowest possible class. This, of course, must be interpreted with common sense. In actual practice, bearing in mind what has been said in the preceding paragraph, there is no difficulty in recognizing the lowest practical class of motion which can be employed to accomplish any given task.

The lowest class of motions is the finger motion. If a job can be accomplished by using only finger motions no further improvement can be made. The use of pure finger motions only, however, is seldom practicable. In most layouts, the aim will be to eliminate all body movements, to reduce many fourth class motions to the third class, and to reduce the length of all motion paths.

Normal and Maximum Working Areas

The second concept underlying workplace layouts is that of normal and maximum working areas. The area in which the worker performs his operation should be kept at a minimum, as this automatically keeps the class of motions which must be used in the lower classifications.

Fig. 1 is a sketch which shows how the normal and maximum working areas for the hands in the horizontal plane are usually determined. In drawing the sketch it is assumed that the worker is comfortably seated at or standing by his bench or table of proper height. His arms hang naturally from the shoulders. Placing his right hand on the near edge of the table approximately opposite his left side, he can sweep his right hand through the arc *AMB* without any

Time, Effort and Money ▲ ▲ ▲

noticeable expenditure of energy. The area included between this arc and the edge of the table is generally said to represent the normal or most comfortable working area for the right hand.

The tacit assumption is made that one point within this area is as easy to reach as another provided the distance moved by the hand is the same. This is not the case. The points which lie along the arc *AMB* can be reached with a motion of the third class. To reach all other points within the area bounded by the arc a fourth class motion must be employed. It requires on the average about 15 per cent more time to make a fourth class motion than it does to make a third class motion of the same length. Hence the arc *AMB* should receive preference when making layouts.

Now even when third class motions can be employed, motions of equal length can not be made in the same length of time at all points along the arc *AMB*. Motions are made most quickly near point *A* and most slowly at point *B*. When motions must be made much beyond point *M* in the direction of point *B*, fatigue increases materially. The closer the hand approaches *B* the more unnatural is the position which the arm must assume. In fact, if the elbow rests on the table, the point *B* can not be reached at all.

The arc which bounds the maximum working area is traced by the fingers when the arm, fully extended, is pivoted about the shoulder. For the right hand, this is arc *CKD* in Fig. 1. The limitations discussed above do not apply to the maximum area. All points can be reached by fourth class motions, and motions can be made as quickly in one section as another. In positioning material within this area, the chief concern should be to keep the length of the movements at a

By H. B. MAYNARD
President, Methods Engineering Council, Inc.

minimum. If possible, the section near *B D* should not be used. Besides involving maximum travel, it requires a rather awkward and fatiguing wrist motion to reach material located in bins anywhere except at point *D*, or in other words, when the arm is not fully extended.

The above discussion applies equal-

ly to the areas used by the left hand and arm.

Improving the Usual Circular Workplace Layout

In order to confine all motions to the third class, material should be placed only along the paths which the hands normal, follow or along the arcs *FLE* and *AMB* of Fig. 1. The only point at which the hands can work together without involving the use of shoulder motions to change the position of the arms is the point *J*. In reality this is not a point but a small area, which is determined by the



Fig. 2—Typical circular workplace set-up.

wrist and finger motions that can be used without moving the arms.

The usual circular workplace set-up is made as shown by Fig. 2. Inspection will show that the arc of the circular workplace coincides with the normal area of the two hands at only two points. This is shown schematically by Fig. 3. When *FE* and *AB* are the arcs described by the left and the right hands respectively when making third class motions and when *NP* is the arc of the circular workplace set-up the hands can reach only points *R* and *S* or the arc *NP* when pure third class motions are used. Hence a better arrangement would be that shown by Fig. 4. The arcs *TU* and *VW* represent the space which should be occupied by materials, and *X* is the point where the work should be done.

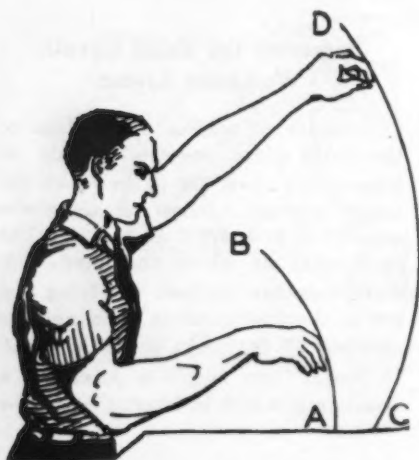


Fig. 5—In the vertical plane, the arc described by the fingers when a third class movement is made is the arc *AB*, while the arc *CD* is the maximum arc made employing a fourth class movement. These arcs determine the efficient placing of materials in the vertical plane.

This set-up is useful for small assemblies where only a few different parts are used. It is not profitable to place material beyond points *T* and *W*, for the length of the movement required to reach beyond these points becomes relatively great, and fatigue increases as was explained above. A short fourth class movement could be made in less time and with less fatigue which suggests putting another row of material containers in front of or in back of *TU* and *VW* if much material must be positioned.

Efficient Work Areas in the Vertical Plane

In the vertical plane, the arc described by the fingers when a third class movement is made is the arc *AB* of Fig. 5, while the arc *CD* is the maximum arc made employing a fourth class movement. These arcs

determine the efficient placement of materials in the vertical plane. When ordinary open containers are banked they are commonly arranged as shown by Fig. 6. This is just the opposite of the way they should be arranged in order to permit the use of pure

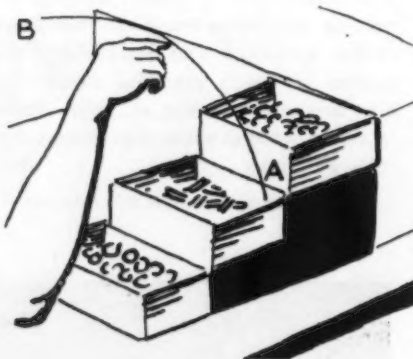


Fig. 6—Common but faulty arrangement of open containers.

third class motions. If parts can be placed in hoppers to be delivered by chutes, the containers can be arranged as shown by Fig. 7. This is an efficient arrangement but it is seldom possible to use it. It should be approached as closely as possible wherever vertical motions must be employed.

When positioning tools which are suspended above the work area, care should be taken to locate them within the sphere which would be generated if the arc *CD*, Fig. 5, were to be rotated above the body of the operator as an axis. If no other equipment or material interferes, the tools should be located on the sphere which would be generated by similarly rotating the arc *AB*, but in any case, they should be located so that they can be reached without the necessity of employing body movements.

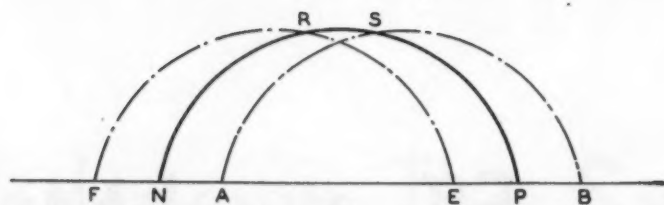


Fig. 3—The arc of the circular workplace illustrated coincides with the normal area of the two hands at only two points.

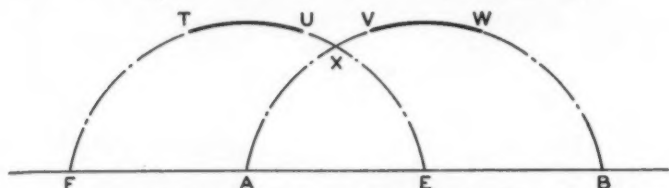


Fig. 4—Improved arrangement shown schematically. The arcs *TU* and *VW* represent the space which should be occupied by materials, and *X* is the point where the work should be done.

The principles of efficient work areas should be applied to all lines of work, for they are universal. It is customary to think of them in connection with bench operations, but they can and should be applied to the arrangement of tools and materials around machines or on work such as molding, forging, and the like and to the arrangement of levers, hand-wheels, and so on, when designing machine tool equipment. When the imaginary boundary lines which limit the normal and maximum working

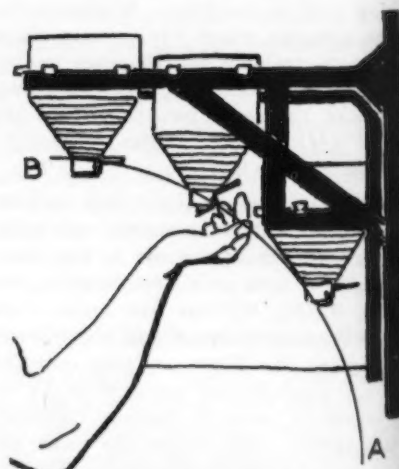


Fig. 7—A good arrangement when parts can be placed in hoppers.

areas in all planes are clearly visualized, it is quite easy to detect inefficient arrangements of work places and to know exactly what steps must be taken to bring about improvement.

In making a layout, the first step is to arrange all materials and tools so that they can be obtained and used with the shortest, lowest class, and least fatiguing motions. When this has been done, the layout should be studied further to balance all motions as nearly as possible with respect to

(Continued on Page 92)

New Things in Materials and Processes

By EDWIN F. CONE

More About High Frequency Melting

IN these comments on page 34 of THE IRON AGE for Sept. 13, 1934, it was stated that induction melting furnaces using current of two frequencies were in use in Europe and certain advantages were claimed. Further investigation discloses the following facts on the authority of the Ajax Electrothermic Corp., Trenton, N. J.:

The use of high and low frequency was simply experimental and has not resulted in a commercial installation. The work was carried on with an inadequate amount of 60-cycle power. It is impractical to use a frequency of 60 cycles when melting from a cold start. If the charge is in a proper condition, it can be melted but the time required is several times that required if frequencies of the order of 1000 cycles are used.

In a coreless induction furnace of the same capacity and same power, 60-cycle power will stir the bath considerably more than 1000-cycle power, but the effective heating with 60 cycles is considerably less. In experiments carried out abroad it was found in refining a high carbon steel bath that the temperature of the bath continually fell when "oreing" down with full 60-cycle power on the furnace. Results of experiments carried out abroad by independent investigators on both high and low-frequency furnaces do not indicate a greater speed of refining in the low-frequency furnace.

The stirring of a steel bath during refining is unquestionably an advantage but the violent stirring of a low-frequency furnace leaves one with the problem of separating the finely

divided slag particles from the steel if the resultant ingot is to be reasonably clean of solid non-metallic inclusions.

It is questionable if ordinary frequency (60 cycles) will give a lower kilowatt-hour consumption per ton of metal treated than higher frequencies and the first cost of an installation will be as great if not greater, due to the extreme cost of 60-cycle power factor correction.

It is to be noted further that if there is sufficient high-frequency power available for superheating the bath or even for holding its temperature constant there is no good reason for going to the extra expense of installing 60-cycle power. Copper coils suitable for carrying 60-cycle power are not best adapted for high-frequency current.

Trends in Steel-Making Costs

AT a recent meeting of one of the local sections in New York of a large technical society, some interesting remarks were made on the cost of steel production. A prominent scientist said that the expansion of the American steel industry has been the direct result of the cheapening of steel by mass production, of building larger and larger furnaces, of the replacement of human labor by machinery, accompanied by a reduction in the total fuel consumption per ton of finished steel.

This tendency has progressed to such an extent, he said, that any further reduction in the cost of ingots and billets can not be expected from further mechanization. A large part of the present cost of ingots, billets,

and blooms is for raw materials delivered at the plant, a large and expanding item of this being for freight and other transportation charges which are more likely to increase than otherwise. And such an increase is not likely to be compensated for by any possible improved efficiency in the use of raw materials, he argued. In the speaker's opinion, the possibility of improving the economy of steel for the consumer is more a matter of augmenting its uniform quality than directly lessening its cost of production.

The steel which has thus far been made has been and is entirely suited to most of the uses to which it is put. In recent years, however, he pointed out, there has appeared an increasing demand for a higher and more uniform quality of steel at a lower price. Many problems have arisen owing to this demand, which can be solved, in his opinion, only by continued, careful investigation.

New Cast Iron for Nitriding

A NEW nitriding cast iron composition, containing no aluminum, has recently been patented. Under United States patent No. 1,972,082 (Sept. 4, 1934) a French metallurgist (Babinet) has assigned to the Nitracastiron Corp., Delaware, a composition of the following approximate range:

Carbon (Total).....	2 to 4 per cent
Manganese	Up to 1 per cent
Silicon	1 to 4 per cent
Chromium	1.5 to 3.5 per cent

If other elements are included, the tungsten content is not to exceed 2 per cent and the titanium, vanadium, molybdenum, and so on not over 1 per cent.

After nitriding cast iron of the general composition mentioned, the Vickers-Brinell hardness has been raised in one case from 490 before nitriding to 710 after and in another from 424 before to 780 after.

"R.D.S."—A New Low-Alloy, High-Tensile Steel

THE new low-alloy, high tensile steel has made its appearance. It is a copper-molybdenum steel which can be used in the as-rolled condition and which has a tensile strength of from 75,000 to 100,000 lb. per sq. in. Its composition is about 1.50 per cent copper and 0.20 to 0.30 per cent molybdenum with a comparatively low carbon content. It is claimed to weld easily and to be resistant to corrosion in the atmosphere. The steel has been developed by the Republic Steel Corp., and has been designated "R. D. S.," the initials standing for "Republic double strength." It is

intended evidently to compete with Cromansil, Cor-Ten, and similar steels.

Molybdenum High-Speed Steel

MOLYBDENUM high-speed steel has often been discussed and many types have been made in years past with little success until quite recently. It can now be said with assurance that a successful commercial product is now available.

Recent experiments have established the fact that molybdenum with tungsten in the proportion of about 4 to 1 gives a ratio of these two elements that insures a satisfactory product. A molybdenum-tungsten high-speed steel with molybdenum ranging from 7.50 to 8 per cent and the tungsten from 1.25 to 2 per cent has stood the test of commercial application.

Several advantages are claimed. With only about 2 per cent tungsten instead of 18 per cent, it is cheaper than the old standard analysis. It has a specific gravity 8 per cent less. It is pointed out that the new composition enjoys a distinct advantage in case of war. The United States is plentifully supplied with molybdenum, but most of its tungsten is imported.

Rolls for Steckel mills made of the new steel are in use.

A Girder Rail 4½ Inches High

AN interesting development in a field in which profits have been few and far between is the production quite recently of a small girder rail for electric street railroads. For many years the regular rail has been one either 7 or 9 in. high. A street railroad company in one of the large Eastern cities has designed and had made for its use a 4½ in. girder rail. A steel girder rail 4½ in. high with a 6 in. base has never been rolled before in this country.

The object in adopting this small rail is that, in substituting it for the higher rails where new rails are required, a decided saving can be effected, particularly in the amount of concrete to be removed.

Alloy Steels in Power Shovels and Tractors

INCLUDING the power shovel and the tractor, the average heavy duty motor truck is subjected to extremely severe service—service which few types of commonly used machinery are called upon to meet. For the severe operating conditions, alloy steels appear essential.

Taking the truck of the White Co., Cleveland, it is stated on the authority of the International Nickel Co.

that approximately 75 per cent of the parts for White trucks are made of heat-treated alloy steels, principally the 5 per cent and the 3.50 per cent nickel, the nickel-chromium or the nickel-chromium molybdenum grades. Applications of these steels include axle shafts, steering knuckles and arms, piston pins, inlet valves, transmission gears, rear axle gears and clutch parts.

Very Thin Sheets of Stainless Steel

ONE of the large producers of stainless steel is now able to roll this product into sheets only 0.004 in. thick and there is some prospect of the thickness being reduced to 0.003 in. and possibly to 0.002 in. The production of sheets as thin as these is by no means easy. Two possible applications are covering airplane wings and the production of a stainless-steel-covered ply-wood.

Notable Performance of Alloy-Steel Transmission Gears

FROM England comes the information that a set of automobile transmission gears has run over 100,000 miles and that, at the time of the inspection, the set was still good for many additional miles. The material in these gears is reported to be a nickel-chromium-molybdenum steel whose physical properties are 269,000 lb. per sq. in. ultimate tensile strength with an elongation of 12 per cent and an Izod impact value of 12 to 25 ft.-lb.

Nickel Alloy Steel in Automobiles in 1933

THE International Nickel Co. says that if all the nickel alloy steel used in the manufacture of automobiles in the United States in 1933 were rolled into a single bar 15/16 in. in diameter, it would circle the earth at the equator. It is presumed that the term nickel alloy steel here includes all alloy steels which may contain other alloying elements as well as nickel. In any event, from the alloy steel view point, this is an imposing calculation.

Practical Uses for Thorium and Uranium

NO small amount of research is being conducted in rare metals in this country. Some of the results were made public at the fall meeting of the Electrochemical Society in New York. Interesting facts were made public regarding thorium and uran-

ium by J. W. Marden, research department, Westinghouse Lamp Co., Bloomfield, N. J.

Two methods have been perfected for the isolation of these metals. Both are obtained in the powder form. Thorium can be made into wire by pressing the powder into a bar, heating it by electric current in vacuo and drawn later into wire. Uranium powder is pressed into cylindrical buttons and heated until it fuses and runs away from the residue, which is mostly oxide. Uranium wire is made from the fused buttons by cold rolling.

There are three principal uses for these metals commercially: Photoelectric cells, glow tube electrodes, and x-ray targets. Suggestions for specific uses of these metals as alloys have not yet resulted in practical information.

Barium in Electric Steel Practice

IT is claimed by M. A. Baerstein, of the National Pigments & Chemical Co., St. Louis, that the addition of a mixture of barium oxide and barium carbonate, about half an hour before pouring, to electric furnace heats of ferrous metals improves the product and adds greatly to the life of the acid lining of the furnace. It is also claimed that the presence of these compounds of barium produce a quieter and steadier arc. When high percentages of sulphur are present, the barium compounds are said to reduce appreciably the amount of sulphur. Less viscous slags are also produced resulting in less slag inclusions in the products.

Vanadium as an Alloy With Rare Metals

THERE are some tangible prospects that vanadium may have some important applications as an alloy with certain rare metals. Today vanadium is familiarly known as an alloying element in many important alloy steels. To produce such steels, the metal vanadium is not used but a ferroalloy of vanadium is employed, as is well known.

According to B. D. Saklatwalla, vice-president of the Vanadium Corp. of America, vanadium metal, when commercially available, may show some very useful properties and may stimulate simpler and cheaper methods for its production than now exists. Alloys of vanadium with such rare elements as thorium, tantalum, and columbium "may have some very remarkable properties."

New Alloy Steels and Their Application to Car Equipment

By G. N. SCHRAMM, E. S. TAYLERSON, and ALBERT F. STUEBING

THE efforts of the railroads to reduce operating and maintenance costs have created a demand for steels embodying combinations of characteristics not heretofore available. The need for materials particularly adapted for use in freight cars found expression in some of the reports of the Committee on Car Construction of the Mechanical Division of the American Railway Association, and was further emphasized by the car manufacturers. To obtain the benefit of the suggestions of the car builders and railroads, a questionnaire asking for specifications or characteristics of the type of special steel that would be desirable for car equipment was sent to the principal users of car materials.

The replies to this questionnaire were almost unanimous in suggesting, first, a considerable increase in strength over low or intermediate carbon open-hearth steel combined with satisfactory forming qualities; second, increased resistance to corrosion; and, third, a price which would not add greatly to the total cost of the complete car. Furthermore, it was considered desirable to have a steel meeting the three foregoing requirements which, when formed either hot or cold, would retain adequate physical properties.

An analysis of different steels in production or in process of development indicated that one possessed outstanding qualities. That was a

THIS article was presented as a paper at the annual meeting of the American Society of Mechanical Engineers at New York, Dec. 4. Mr. Stuebing is railroad mechanical engineer, commercial office, United States Steel Corp., New York. Mr. Taylerston is manager, research laboratory, American Sheet & Tin Plate Co., Pittsburgh. Mr. Schramm is identified with the corrosion research laboratory, American Sheet & Tin Plate Co., Vandergrift, Pa.

chromium-copper-silicon steel of low carbon content, which has since been produced commercially under the name of Cor-Ten. One of the unique advantages of this steel is the fact that the excellent physical properties are derived from the alloying elements and it is essentially a non-air-hardening steel. Even rapid cooling from any temperature normally used in fabricating does not produce appreciable hardening. Cold working, however, will develop increased hardness with correspondingly higher yield point and ultimate strength.

The resistance to corrosion of this material, under ordinary conditions, was found to be considerably greater than any other available steels with the exception of the more costly high-chromium steels.

To afford a selection of material of high tensile strength, with a smaller price differential over ordinary open-hearth steel, it was decided to make available, also, in forms suitable for car construction, two steels which had previously been used in forgings and rolled sections, namely, a medium-manganese steel, now produced under the name of Man-Ten, and a structural silicon steel, which has been given the name Sil-Ten. These two steels are available with a small percentage of copper, in which case the resistance to atmospheric corrosion is on a par with copper-bearing open-hearth steel, but lower than that of Cor-Ten.

The chemical composition of Cor-Ten, Man-Ten and Sil-Ten, as well as similar data for ordinary and copper steel, is shown in Table I, and the physical properties in Table II, for sheets and strip, and Table III, for shapes, plates and bars.

The properties of ordinary open-hearth steel, Man-Ten and Sil-Ten, are well known. Since Cor-Ten steel is a new composition, it seems desirable to point out some of its significant features.

The physical properties of Cor-Ten shown in Table II are values obtained in tests of sheets and other thin sections and represent minimum values. Table III shows values for plates, shapes and bars. The latter may show yield points and tensile strengths considerably above the guaranteed mini-

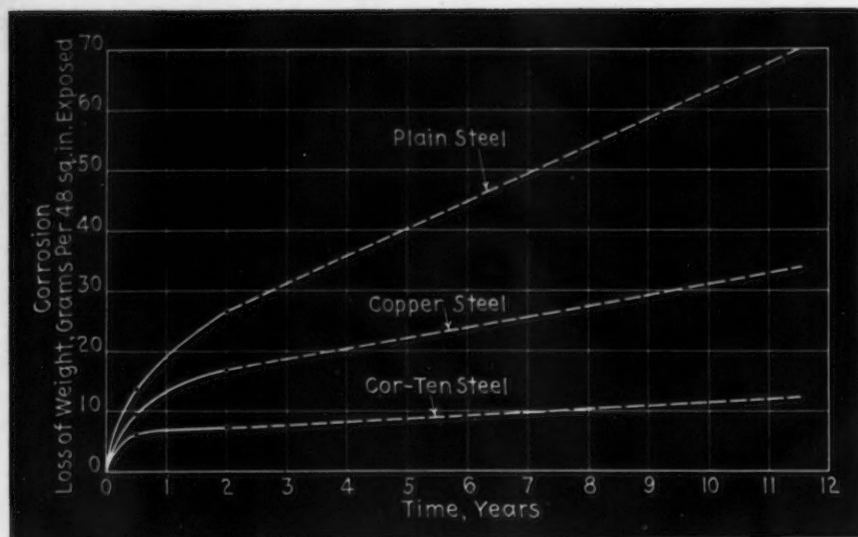


Fig. 1—The corrosion resistance of Cor-Ten and other steels in an industrial atmosphere (Annealed, pickled samples, exposed on both sides. The extended lines, drawn straight, will become slightly parabolic in all three cases as further data are obtained.)

ma, depending on size, gage and rolling practice, still retaining sufficient ductility to provide a satisfactory degree of workability.

Izod tests at -30 deg. F. indicate from two to two and one-half times the values for Cor-Ten that are obtained with low-carbon open-hearth steel.

A noteworthy feature of this steel is the high ratio of the endurance limit to the tensile strength, which is 0.60 to 0.70. This has been consistently shown in several endurance tests and seems to be characteristic of this alloy.

In rivet-shearing tests made on $\frac{5}{8}$ -in. diameter, hot-driven rivets in double shear Cor-Ten developed an ultimate average shearing value of 81,500 lb. per sq. in. The ultimate tensile strength of the rods from which the rivets were made was 80,900 lb. per sq. in. Man-Ten rivets developed 89,800 lb. per sq. in. average ultimate shearing strength, the tensile strength of the rods being 97,990 lb. per sq. in. The bearing values per square inch in both cases were more than twice the shearing values.

Since ductile steels in general show a definite relationship between ultimate shearing stress and ultimate tensile stress, it is believed that the rivet shearing value for Cor-Ten may be taken as approximately equal to the ultimate tensile strength and for Man-Ten as 90 per cent of the ultimate tensile strength, with bearing values twice as great in each case.

Experience in the production of

¹ See Schramm, G. N., and Taylorson, E. S., The Influence of Rainfall and Smoke on the Corrosion of Iron and Steel, Corrosion Symposium, American Society for Testing Materials, March, 1934.

Cor-Ten has shown that it can be rolled in general in forms commonly used in car building. The new A.R.A. center sill Z-bar section has been rolled successfully with the web reduced from the standard dimension of 13/32 in. to a thickness of 5/16 in., effecting a decrease of 14 per cent in weight. Cor-Ten has also been pierced and rolled into seamless pipe.

Resistance to Corrosion

Atmospheric corrosion tests of steels were conducted by exposing cleaned and weighed samples, principally sheets, to the action of weather conditions at several typical locations. The amount of corrosion of the different materials was determined by measuring the loss of weight of samples exposed under strictly comparable conditions, which has proved to be the most accurate method. In all the corrosion tests care was taken to compare only those samples which were initially exposed at the same time and for the same period of time at the same location.¹ In some cases steels have been graded according to the time required for corrosion to perforate sheets of the same original thickness, but visual observation of rusted materials may result sometimes in misleading conclusions.

In the development of Cor-Ten and other steels over a period of six years, more than 30,000 samples, comprising about 850 materials in 145 different laboratory and field tests, have been studied.

Representative samples of Cor-Ten and other steels exposed to an industrial atmosphere for more than three years indicate that this steel under the conditions of the test has a re-

sistance to atmospheric corrosion four to six times as great as good plain steel, depending on the quality of the plain steel with which it is compared. Some of the results obtained to date are shown graphically in Fig. 1. It is evident that the units in which corrosion is expressed may be readily converted into other units, such as average depth of penetration. The values remain the same, relatively, regardless of the method of interpreting the data.

Attention is directed to the fact that the corrosion-time relationship of steel is not linear, and that it is not logical, therefore, to assume that the rate of corrosion of steel is the same throughout its period of service. This relationship, which the authors believe has not been pointed out heretofore, has been verified by a study of the curves of hundreds of different kinds of iron and steel.

It will be seen that the period of usefulness of a structure cannot be anticipated from a single set of corrosion observations on samples of the steel used in the structure. It is essential that designers and engineers know the shape of the curve representing the corrosion-time relationship of the material which has been selected for the structure.

The slow, rapidly decreasing rate of corrosion of Cor-Ten in the atmosphere results in a smooth evenly corroded surface. The coating, or rust film, that forms is harder and much more adherent than that which forms on ordinary steels. Severe abrasive action is necessary to remove this dense coating, and after it has been removed the base is found to have been corroded uniformly. This uniformity of corrosion is a definite advantage in car structures.

The increased interest of the railroads in light-weight freight car construction emphasized the need for a steel combining greater strength and increased durability. Since the most important corrosion problem of the railroads involves the durability of open-top cars, particular attention has been directed to the factors which cause rapid deterioration and to the manner in which Cor-Ten may be applied to this type of equipment. The most suitable way in which a steel may be tested, lacking long time service tests, is by subjecting the material to selected natural corrosive conditions which approach in character those encountered in service. With the thought that the water which seeps through coal in a coal mine is similar to that which seeps through coal in a freight car, samples of many steels were immersed in the acid

water of an underground stream. After four months' immersion under these extremely corrosive conditions, Cor-Ten was found to be more than twice as resistant as copper steel and about three times as resistant as good plain steel. Contrary to usual experience, a smooth adherent coating formed on this material. The metal was uniformly attacked; there were no deep pits, furrows or holes as there were in the other steels.

The corrosion of steel cars by coal depends largely on the kind of coal and the length of time coal is stored in the cars, but the corrosion of steel cars in coal service or regular service depends largely on the quality of the steel used in the cars with respect to its resistance to atmospheric corrosion, because cars in normal service are exposed to atmospheric corrosion throughout more than half their normal service life. Careful studies indicate that about 70 to 90 per cent of the corrosion of an average coal car is due to exposure to atmospheric conditions. The superiority of Cor-Ten in the atmosphere, and in running water of an acid nature which had seeped through coal in a coal mine, indicates that this material should be far more satisfactory for use in cars to be placed in normal service than the steels used at present. Furthermore, since the scale formed on Cor-Ten is of a dense, hard nature and is difficult to remove, and since the characteristics of this steel make it more resistant to abrasion and denting, it is expected that when subjected to the combined corrosive and abrasive action of coal, sand, cinders, etc., it will prove much more serviceable than ordinary open-hearth of copper steel. Hopper cars and mine cars constructed of Cor-Ten are now in service.

Cor-Ten is resistant to other corrosive influences. As a means of determining its durability under the combined atmospheric and brine spray conditions which may exist in and around refrigerator cars, icing stations and right-of-way equipment, samples were compared by exposing sheets to an industrial atmosphere at an angle of 5 deg. from the horizontal and spraying them twice weekly with a 10 per cent salt solution. The spraying was applied to both sides of the specimens and was continued each time only long enough to wet the samples. This severe treatment was continued for a period of three months.

The quantitative data obtained under these conditions showed Cor-Ten to be twice as durable as copper steel and almost three times as good as open-hearth steel or iron. The rust

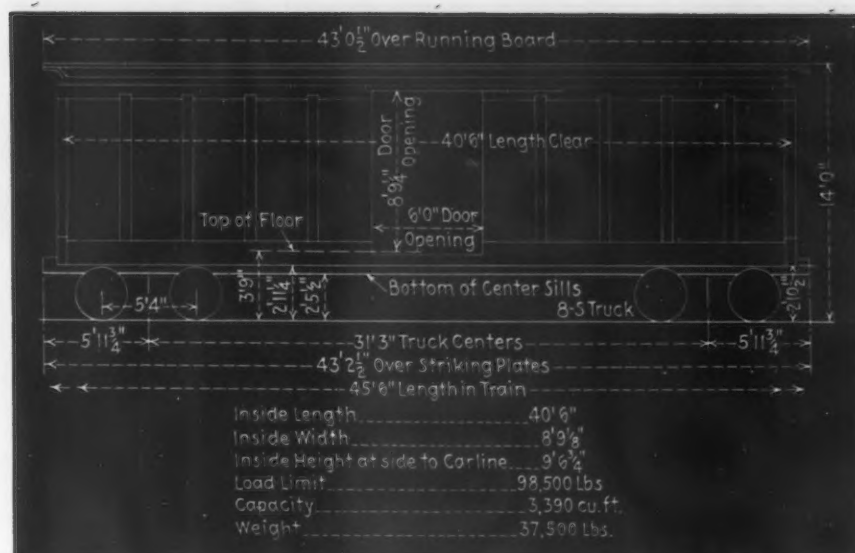


Fig. 2—Drawing of Baltimore & Ohio Class M48 box car. Photographs of the B. & O. Class N 29 and Class N 30 hopper cars were shown in connection with a descriptive article in *The Iron Age*, Sept. 20, 1934, page 24.

on all of the ordinary steels had many raised patches which flaked severely during the test, revealing deep pits and holes. The rust that formed on Cor-Ten steel was much smoother and the base was corroded much more uniformly.

Shop Practices for High-Tensile Steels

In proposing the application of these special steels in car construction one of the governing considerations was their adaptability for forming cold or hot. The physical properties of all three materials are such that these steels can be bent or pressed cold with only moderate and reasonable changes from the common practice in using low-carbon steel. The technique of forming them is slightly changed from that of ordinary carbon steel, consisting principally of making provision for more liberal radius of bend, slightly increased die clearance, and more spring-back of the bend. These features produce no particular difficulties after the shop forces understand how the steels should be worked.

It is natural to expect that these steels, having considerably higher physical properties, even though they retain good ductility, would be stiffer and, therefore, more difficult to bend or press cold. Both Cor-Ten and Man-Ten, however, have been satisfactorily formed as ordinarily required in car building practice. It has been found that for cold flanging to an angle of 90 deg. the radius of the bend with sheets of either of these steels should be at least twice the thickness of the material to insure good results. If

plates 1/4 in. or more in thickness are to be pressed in the "as rolled" condition, either with or across the direction of rolling, the diameter of the fillet should be three times the thickness of the section. Experience has shown that normalized light plates of Cor-Ten pressed cold do not spring back any more than ordinary open-hearth pressed in the "as rolled" condition.

As regard hot forming operations Cor-Ten may be classed with low-carbon steel because it is essentially a non-air-hardening steel. Man-Ten and Sil-Ten, however, have higher carbon content; therefore, normal care must be taken to insure that shop practices are not detrimental to these materials. In hot pressing Cor-Ten the most satisfactory results have been obtained at temperatures of 1500 deg. to 1600 deg. F. Man-Ten should be pressed at 1400 deg. to 1500 deg. F.

Test pieces cut from the webs of diaphragms, both hot and cold pressed, show a moderate increase in the yield point of the Cor-Ten material, with practically no change in ultimate strength and elongation as compared with test pieces taken from the same sheets before pressing.

Cor-Ten rivets should be driven at temperatures between 1800 deg. and 1900 deg. F. At lower temperatures the material is stiffer and more difficult to drive than ordinary open-hearth steel.

Electric Arc Welding

Cor-Ten steel can be welded satisfactorily by using any one of several coated carbon steel electrodes. The

TABLE I—Chemical Properties of Low-Carbon Steel and of Low-Alloy High-Tensile Steels

Chemical Composition	Regular Open-Hearth	Cor-Ten	Man-Ten	Sil-Ten
Carbon, per cent max.....	0.10	0.10	0.35	0.40
Manganese, per cent.....	0.30-0.50	0.10-0.30	1.25-1.70	0.70-0.90
Phosphorus, per cent.....	0.04 max.	0.10-0.20	0.04 max.	0.04 max.
Sulphur, per cent max.....	0.05	0.05	0.05	0.05
Silicon, per cent.....	0.10	0.50-1.00	0.15 min.	0.20-0.30
Copper, per cent.....	0.20*	0.30-0.50	0.20*	0.20*
Chromium, per cent.....	....	0.50-1.50	....	....
Corrosion resistance (atmospheric, comparative)	1 (or 2 to 3 with copper)	4 to 6	1 (or 2 to 3 with copper)	1 (or 2 to 3 with copper)

*If specified.

TABLE II—Physical Properties of Low-Carbon Steel and of Low-Alloy High-Tensile Steels in Sheets and Strip

Physical Properties	Regular Open-Hearth	Cor-Ten	Man-Ten
Yield point, lb. per sq. in.....	25,000 min. to 35,000 min.	50,000 min. to 60,000 min.	55,000 min. to 65,000 min.
Tensile strength, lb. per sq. in....	35,000 min. to 50,000 min.	65,000 min. to 75,000 min.	80,000 min. to 90,000 min.
Elongation, per cent in 2 in.....	34 to 25	27 to 22	25 to 20

Ranges of physical properties are minima and cover possible heat treatments suitable for sheets.

strength of such welds, properly made, is substantially equal to that of the parent metal, and ductility is ample. There is no evidence of electrolytic action or accelerated corrosion at the junction of the deposited metal and the parent metal.

If it is desired to have the deposited metal of approximately the same composition as the Cor-Ten, this can be accomplished by using electrodes of special composition, which are now available. The results of tests of welds made with such electrodes and also with coated carbon steel electrodes are shown in Table IV.

Punching, Drilling and Reaming

Tests have been made to determine the power consumption and time required for punching, drilling and reaming Cor-Ten and Man-Ten steels in comparison with ordinary open-hearth steel. Plates of equal thickness were used in these tests and the same operations were performed on each material.

The punching tests indicated that the costs for Cor-Ten and Man-Ten were practically the same as for ordinary open-hearth steel, the only possible variation being an increase of not over 25 per cent in power consumption and a similar increase in tool maintenance, with no change in time or labor cost.

Tests made by drilling 5/8-in. holes with high-speed drills in plates 1/2 in. thick indicate that the actual drilling speed for Man-Ten can be the same

as for ordinary open-hearth steel, but for Cor-Ten the rate should be reduced about one-third from the maximum permissible with open-hearth steel, to insure satisfactory life of drills. In counter-sinking with manual feed there was no appreciable difference in time or power consumption between ordinary open-hearth steel and Cor-Ten, but with Man-Ten the time was 20 per cent less.

Reaming tests were conducted on 1/4-in. plates of the same steels and consisted of enlarging punched holes from 5/8 in. to 3/4 in. and from 3/4 in. to 13/16 in. with a portable electric motor-driven reamer. The time required was the same for all three steels but the power consumption when reaming Cor-Ten and Man-Ten was approximately 30 per cent less than when reaming the open-hearth steel. This result was contrary to expectation and was therefore carefully checked by a second series of tests, which confirmed the original tests.

A probable explanation of the lower power consumption of the high-tensile steels was found in the action of the cutters. When reaming Cor-Ten and Man-Ten, the reamers cut a clean chip, whereas the softer open-hearth steel seemed to deform and cause a frictional drag on the cutter.

The reaming tests demonstrated that Cor-Ten and Man-Ten can be reamed with no increase in labor cost as compared with open-hearth steel and with lower power consumption. The reamers used in the Man-Ten steel showed slight discoloration at

the point, and it was thought that, in production, reamers used in this material might require redressing at slightly shorter intervals.

Deductions drawn from these tests indicate that, because of the decreased weight and thickness of parts made of Cor-Ten or Man-Ten as compared with ordinary steel, there would be little, if any, increase in the total labor costs in building cars of the high-tensile steels.

Cars Constructed of High-Tensile Steels

The first cars constructed of Cor-Ten steel were built by the Baltimore & Ohio in its Mount Clare shops. These included a hopper car, railroad class N-29, with center hoppers and end hoppers, a hopper car, class N-30, with center hoppers only, and a box car, class M-48.

All three designs have been provided with a cushion center sill separate from the underframe, with long travel draft gear interposed between the center sill and the car body. This construction was used by the engineers and designers of the railroad company with the thought that it would reduce the forces exerted on the car body in buffing and pulling. The severe impacts which occur in freight service cause the actual stresses in the car body to increase by an indeterminate amount over the calculated static stresses and this increase will be less as the end forces due to impact are decreased.

The trucks used on these cars have side frames and bolsters of heat-treated alloy steel castings and one-wear rolled steel wheels. The hopper car trucks, with 5 1/2 by 10-in. journals, weigh 6760 lb. each, while the trucks for the box car, with 5 by 9-in. journals, weigh 6550 lb.

Both hopper cars have bodies in which the sides function as the principal load-carrying members. The top chords are of 1/2-in. plate with a pressed reinforcement of 3/16-in. plate. The side sill, which forms the bottom chord, is of 1/2-in. plate, pressed to a Z-section. The side sheets are 3/32 in. thick, with corrugations 3/4 in. deep, spaced on 3-in. centers. The cross ridge at the center line of the car is capped by a channel pressed from 5/32-in. plate which extends down one gusset, over the cross bearer, and up the opposite gusset. The body bolster web plate is 3/16 in. thick. The weight of the body of the class N-29 car is 18,480 lb. and of the class N-30 car 17,680 lb.

The class M-48 box car likewise has the body framing built up largely

of pressings, to secure disposition of material that will combine lightness and strength. The side posts are a flanged U-section of $\frac{1}{2}$ -in. plate 3 in. deep and $7\frac{1}{4}$ in. wide. The side plate, which forms the top chord, is also of $\frac{1}{2}$ -in. material, pressed in a modified Z-section 15 $\frac{5}{16}$ in. deep. The end plate is a similar section. The side sill is of the same thickness, 18 in. deep with a $2\frac{3}{4}$ -in. flange. The end sill, also of $\frac{1}{2}$ -in. plate, is 10 $\frac{1}{2}$ in. deep with a 6-in. horizontal flange. The side sheets and end sheets are $\frac{1}{16}$ in. thick.

The roof is constructed of sheets $\frac{1}{32}$ in. thick, with corrugations $\frac{1}{2}$ in. high spaced 2 in. center to center, supported on carlines of a flanged W-section, $4\frac{1}{2}$ in. deep at the center, pressed from $\frac{3}{32}$ -in. sheets. Each roof sheet is carried across the car from one side plate to the other.

The weight of the body of the class M-48 box car is 24,380 lb.

An experimental hopper car, designed to utilize the improved properties of Cor-Ten steel, has been built by the Pressed Steel Car Co. This car has been fully described;² therefore, reference will be made only to some of the special features of the design.

The center sill is of the new A.R.A. Z-bar section, reduced to 17.5 sq. in. The side posts are in two parts with the sheets between them. To reduce stresses in sheets due to pressure from the lading, particularly when the car is unloaded by overturning, some of the panels have been dished outwardly at the center.

To reduce deflection of the center sill to the minimum, it is tied to the girders formed by the sides at intervals of 5 ft. or less, through the bolsters, cross ridges and cross bearers.

Each hopper chute is pressed from a single sheet, thereby eliminating the joints which ordinarily extend down the outside corners. This was done to avoid retention of lading and moisture, which might contribute to contact-corrosion. Man-Ten steel has been used in the brake rods and brake levers.

The weight of this car is 30,000 lb. and of the body alone 17,800 lb. The design of this car provides adequate cubic capacity to take full advantage

TABLE III—Physical Properties of Low-Carbon Steel and of Low-Alloy High-Tensile Steels in Plates, Shapes and Bars

Physical Properties	Regular Open-Hearth	Cor-Ten	Man-Ten	Sil-Ten
Yield point, lb. per sq. in.	0.5 x ten. str.	50,000 min.	55,000 min.	45,000 min.
Tensile strength, lb. per sq. in. ...	48/58,000 or 50/65,000	70,000 min.	85,000 min.	80/95,000
Elongation, per cent in 2 in.	27 or 25	27	23	24
Endurance limit, lb. per sq. in. (normalized)	25,000	45,000	40,000	....
Modulus of elasticity, lb. per sq. in.	28.-30. x 10 ⁶	28.-30. x 10 ⁶	28.-30. x 10 ⁶	....
Izod impact, ft. lb. (normalized) ..	30	60	40	....
Coefficient of expansion, per degree F., 70 deg.-200 deg. F.	6.4 x 10 ⁻⁶	6.7 x 10 ⁻⁶	6.3 x 10 ⁻⁶	....

TABLE IV—Tests on Welding of Cor-Ten Plates

Thickness of Cor-Ten plates, $\frac{3}{8}$ in.			
Spacing of plates for butt welding, $\frac{1}{2}$ in. apart.			
Welding machine voltage 35; current, 180 amp.; polarity reversed.			
Size of welding rod, $\frac{3}{16}$ in. diameter.			
Tensile properties of samples, comparative tests on $\frac{3}{8}$ -in. plates.			
	Ultimate	Elongation in 2 in., Per Cent	Elongation in 1 in., Per Cent
Cor-Ten plates, before welding.....	70,700	33.0	....
Plates welded with Cor-Ten-Weld rod.	74,200	17.5	23.3
Plates welded with regular carbon-steel welding rod.....	71,700	19.7	26.8
Similar tests made on $\frac{1}{4}$ -in. Cor-Ten plates, with original ultimate strength 79,400 p.s.i. and 25.5 per cent elongation, showed for the Cor-Ten-Weld 76,400 ultimate, 15.3 per cent elongation in 2 in., and for the regular carbon-steel weld 71,300 ultimate, 12.5 per cent elongation. The elongation in 1 in. was 22 per cent in both cases.			
Nick-break tests showed a fine crystalline fracture, free from porosity.			
Brinell hardness tests on specimens of $\frac{3}{8}$ -in. Cor-Ten plates, welded with Cor-Ten-Weld rod, gave the following results:			
(a) At the weld—135, 135, 135.			
(b) Plate adjacent to weld—143, 143, 140.			
(c) Plate, as produced—143, 143, 140.			

of the allowable load limit in carrying coal at 52 lb. per cu. ft. thus securing a ratio of revenue load to gross weight of 81.9 per cent.

The Mount Vernon Car Mfg. Co. has built an experimental 40-ton refrigerator car with dry-ice temperature control. The car has a steel frame patterned after the A.R.A. single-sheathed box car. About half of the steel parts are of Man-Ten, 5330 lb. of this material replacing 7900 lb. of ordinary steel, effecting a reduction of weight of about 30 per cent. In future designs the builder intends to use high-tensile steels exclusively and anticipates a proportionate saving of weight throughout the entire body structure.

The same builder is constructing a 50-ton steel sheathed box car, modified in some details from the A.R.A. design. Cor-Ten steel is being substituted for ordinary open-hearth steel, with a saving of 4380 lb. or 25 per cent in the weight of the steel in the car body.

In numerous other instances, applications of Cor-Ten and Man-Ten steels have been made alongside other types of steel in floor and side sheets, doors, ends and roofs. From these installations it is expected that com-

parative data will soon be available regarding the service of these materials under actual freight car operating conditions.

Passenger Cars

A number of important designs of passenger cars have been brought out in recent months incorporating high-tensile steels. It would be impractical in this paper to present such detailed descriptions as would be required to do justice to the originality of the several designs. Therefore only the most striking features can be mentioned.

Stainless steel containing 18 per cent chromium and 8 per cent nickel has been used extensively in high-speed trains built by the Edward G. Budd Mfg. Co. by its shot welding process. The superior characteristics of this material are well known. The equipment in which it was used includes the Budd Micheline car, introduced in 1931, a self-propelled car for the Reading Co., two-car trains for the Pennsylvania Railroad and the Texas & Pacific, a five-section articulated car for subway and elevated service on the lines of the Brooklyn-Manhattan Transit Corp.³ and the Burlington Zephyr,⁴ with

² See *Railway Age*, Nov. 10, 1934, page 573. *THE IRON AGE*, Nov. 15, 1934, page 52.

³ See *THE IRON AGE*, July 19, 1934, page 28. *Transit Journal*, August, 1934, page 251.

⁴ See E. C. Anderson, *The Burlington Zephyr*, and R. Eksergian, *Design of Light-Weight Trains*, Denver meeting, A.S.M.E., June, 1934. *Railway Age*, April, 14, 1934, page 533. *THE IRON AGE*, Aug. 4, 1934, page 8.

which everyone is familiar. The construction of the cars and trains mentioned has been described in detail. These numerous applications of 18-8 stainless steel indicate that this material has a definite place in car construction where the maximum economies can be obtained by reduction of dead weight, because of its suitability for fabricating into structures combining extremely light weight with relatively high strength, and maximum resistance to corrosion.

The first application of Cor-Ten steel in passenger car construction was made in the body of the Model B street car designed under the direction of Dr. C. F. Hirshfeld for the Electric Railway Presidents' Conference Committee, and built by the

⁵ See *Transit Journal*, September, 1934, page 274. *THE IRON AGE*, Oct. 4, 1934, page 19. *Steel*, Oct. 1, 1934, page 9.
⁶ See *Transit Journal*, June, 1934, page 174. *Steel*, Oct. 1, 1934, page 29.
⁷ See *Railway Age*, April 7, 1934, page 516.

Pullman Car & Mfg. Corp'n. This has been described in various publications.⁵ The body is an interesting example of light-weight unit construction formed of high-tensile steel by welding the frame members and sheathing into a rigid structure.

Another street car embodying principles developed by the Presidents' Conference Committee was built by the J. G. Brill Co., with a light-weight body formed of sections and pressings of carbon-vanadium steel.⁶

The Baltimore & Ohio is having built by the American Car & Foundry Co. two streamlined passenger trains, one of Cor-Ten and Man-Ten and the other with aluminum superstructure and Cor-Ten underframe. These trains will be equipped with cushion underframes and tight-lock couplers. Two streamlined trains built of Cor-Ten are also under construction for the Gulf, Mobile & Northern by the same builder.

The Standard Steel Car Co., subsidiary of the Pullman Car & Mfg. Corp'n., is building at the Pullman Bradley Works 50 passenger coaches for through service for the New York, New Haven & Hartford, also 10 passenger coaches for through service and 21 suburban coaches for the Boston & Maine. The bodies of these cars are built largely of Cor-Ten with Man-Ten in the center sills, draft sills and bolsters, thus marking the first application of high-tensile steels in modern coach construction. A substantial weight saving, from 135,000 lb., the weight of the present coaches, to 100,000 lb., the estimated weight of the new cars, was effected.⁷ A light-weight self-propelled train to be built for the Illinois Central by the Pullman Car & Mfg. Corp'n. at its Pullman Works will also be constructed principally of Cor-Ten.

In this paper it has seemed advisable to discuss in detail only those materials which have been extensively applied. The tendency which is apparent at this time, to adopt a wider range of materials for car construction, will probably lead to the use of other steels especially suited for particular service conditions. Among those which are being considered or undergoing tests are Plykrome, a laminated steel having a stainless sheet on one side and ordinary carbon steel on the other, 4 to 6 per cent chromium steel, and 12 per cent chromium steel.

Recent developments indicate that future car design will seek to develop to the utmost the technical and economic possibilities of ordinary carbon and copper steels and will then utilize the low-alloy high-tensile steels, the higher alloy steels already mentioned, and perhaps additional materials, each in the application to which it is best adapted.

The economic factors affecting car design are now being given careful study. Such investigations will better enable engineers to evaluate the merits of different designs and materials, with their varying degrees of strength, corrosion resistance and wide range of cost, and will assist in the development of car design along logical and progressive lines.

The authors desire to acknowledge assistance received in the preparation of this paper from the various railroads and car builders mentioned, from their colleagues in the subsidiary manufacturing companies of the United States Steel Corp'n., and from J. A. Ralston, manager of the Railroad Research Bureau of the subsidiary companies.

Editor's Note: This is a series of observations which, strangely enough, are exactly what they purport to be. In other words, they come from the daily diary of a real boss; a prominent executive in the metal-working industry who prefers to remain an anonymous author.

The Boss's Diary

What a whale of a difference the point of view makes!

I went down into the plant a while ago and stopped to chat with the blacksmith. He is a sort of David Harum spirit born into the flesh of a French Canadian. He greeted me something after this fashion—"Good morning Mistair Bozz, did you know I em a meellionhair?" "No," I replied, "I didn't know that, but I've always thought it would be nice to number a millionaire or two among my friends." "Well," said the blacksmith, "I am a meellion=hair, the honly defference between me and the hother meellion=haire is that I've got the first dollar and they've got the last."

What a delightful philosophy he had and he bore it out in his private affairs too. With his blacksmith's earnings he bought himself a small plot of ground; with his work=hardened hands he himself framed a house, kept a little live=stock and grinned at the world. He had all the joys of the millionaire minus the fretting worry of investments, income taxes and chiselers.

New Bullard Line Adds to Mult-Au-Matic Features

THE new Bullard type J Mult-Au-Matics built in two sizes, J-7 and J-11, by the Bullard Co., Bridgeport, Conn., is designed for the smaller classes of work and by comparison with the older types of Mult-Au-Matic shown in the background on page 40, the J type constitutes a small, compact unit.

Push button control, from three stations, over electrical and mechanical features, which control is not available in the larger Mult-Au-Matic equipment, further indicates the efficiency of electrical control in machine tool operation.

Each control station has one button for each, emergency control; for starting the main drive motor; for head traverse advance; and for head traverse return. The head traverse advance and return is operated from a separate motor.

In this eight spindle machine, one loading station and seven working stations are provided. Each station has independently variable speeds. The J-7 machine has 41 speed changes from 168 r.p.m. to 1509 r.p.m.

The initial range for J-11 in 41 changes, is from 84 r.p.m. to 754 r.p.m. In addition to these available changes, a dual range governs in a 2 to 1 reduction, all speed settings at the seven work stations. High spindle speeds and the rapidity of index, call for synchronization of spindle and spindle drive gears at the time of reengagement after index; such synchronizing mechanism is supplied and it is said, assures a minimum gear wear and supplies positive, quiet gear meshing.

The seven feed works brackets are cast integral with the feed works base in the interest of rigidity and lessened vibration. This unit assembly does not interfere with individual and independent operation of the seven screw type feeds for each station. Adjustments provide for either short or long feed and permit setting for short feed with almost instantaneous return of heads to neutral position at end of feed stroke. The total maximum stroke, 10 in. traverse and feed combined, can be divided into various combinations to suit specifications, but always within limiting factors—minimum traverse stroke $1\frac{1}{8}$ in. and minimum feed stroke $\frac{1}{4}$ in. Rates of feed per revolution of spindles are the same for both machines and range in 41 changes from 0.004 to 0.036.

Chucking has been given extended attention; three-jaw, universal chucks, operated by mechanical power, are used.

The mechanism is in-built and has adjustment for the varying of holding pressure. The control is by foot

lever at the loading station, and is said to be equally effective with chucks or fixtures.

Bullard patented double indexing is available and provides machine flexibility for first or second operation work. Two adjacent loading stations are used in case of first and second operation chucking. This allows three working stations for each. Anti-friction bearings are used throughout. Automatic pressure lubrication is supplied to all moving parts; an automatic lubrication pressure switch is so installed as to disconnect motor circuits in the event of lubrication failure. For cutting lubricants, a separate, easily positioned and easily cleaned unit can be supplied, and consists of an L-shaped container with reservoir, pump, motor and control.

The materials used in construction are selected on the basis of long experience in field of machine tool activity.

Hydraulic Surface Grinder Design Provides Tilting Head Feature

THE Hill Clutch Machine & Foundry Co., Cleveland, builds a new heavy-duty hydraulic surface grinder which has the head arranged so that it may be tilted off the vertical position to permit of concave grinding. A 14-ft. model is shown on page 40. Long shear blades and flat surfaces are said to be conveniently handled in gaining accurate grinds. The table drive is through a motor-driven hydraulic pump and two opposed pistons and

Tool heads are available in two types—the plain vertical head of one-piece construction and having a 10-in. vertical movement only. The plain compound head, a single tool slide mounted on the saddle, and having a total stroke of 10 in., which stroke may be applied as vertical movement only or applied to include a maximum $1\frac{1}{2}$ -in. movement in either right or left horizontal direction.

An accessory drill head of live spindle type, with anti-friction spindle bearings, has change gear provision for variable speeds. Multiple die heads also, can be used. There is an accessory boring head of high speed diamond boring type. These accessory heads may be used at any station.

The main drive is by 10-hp. motor, vertically mounted and direct connected. Model J-7 has a 3 hp. and model J-11, a 5-hp. motor for traverse movements. All motors may be either A.C. or D.C.; rated constant speed 1760 r.p.m. under full load.

The projected floor space required is,—Model J-7, 50 in.; Model J-11, 58 in., in diameter. The L-shaped space required for cutting lubricant container is approximately $31\frac{1}{2}$ in. by $32\frac{1}{4}$ in.

cylinders; this hook-up is said to provide for a wide range of speeds. The volume of oil is controlled in the pump, the pressure remaining constant. The grinding head is counter-balanced. The $5\frac{1}{2}$ -in. spindle is mounted on roller bearings at each end and has a ball-bearing mounting at its longitudinal center. The equipment is available with table lengths of 10 ft. and longer.

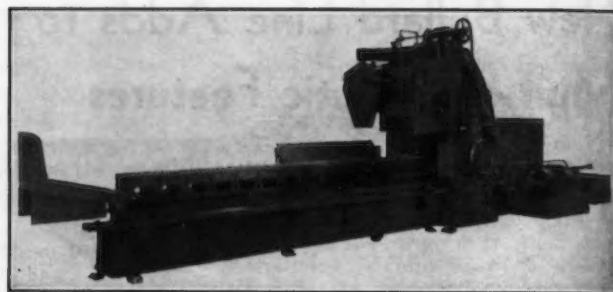
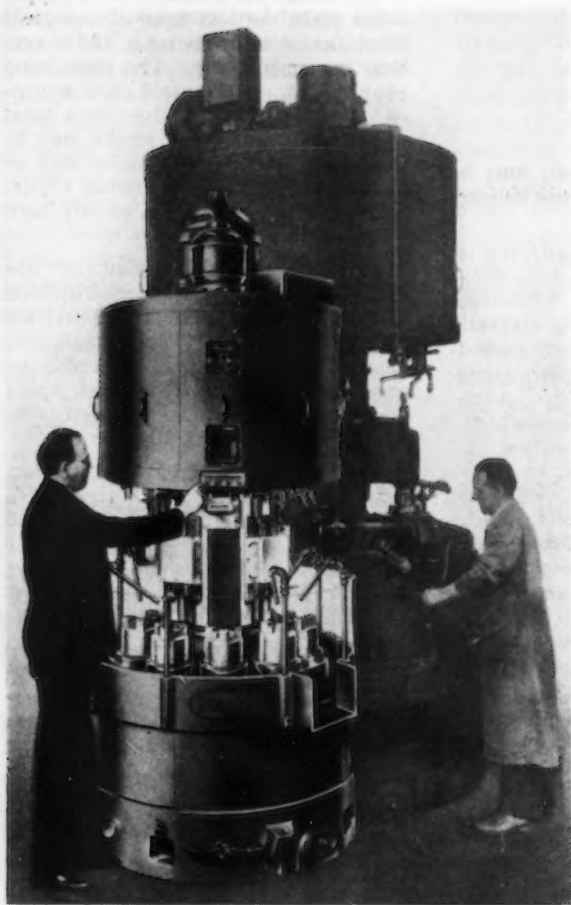
"Stay-Put" Grip for Medium Size Castings

A NEW grip device, for the designed purpose of holding medium sized castings in a stay-put position for snagging and trimming operations, is a recent product of the Sullivan Machinery Co., Chicago, and is illustrated on page 40.

The device consists of a base-plate, which may or may not have legs, as desired, an adjustable back-stop, and an air-operated jaw. In operation, the casting, of practically any shape and of variable width, ranging from 2 in.

to 20 in., is placed against the adjustable back-stop and the air-operated jaw is set in motion through an air valve. This jaw closes in on the casting slowly, safeguarding the fingers of the operator. When the work to be done is completed the jaw release is a quick movement. The device is said to supply holding-assurance which is sometimes lacking in the handling of medium sized work.

The Climax Molybdenum Co., New York, has removed its general offices from 295 Madison Avenue to 500 Fifth Avenue.



ABOVE

THIS heavy-duty hydraulic surface grinder has a feature arrangement for concave grinding. See page 39.



AT RIGHT

A "STAY-PUT" device for holding troublesome, medium-sized castings during clean-up operations is referred to on page 39.

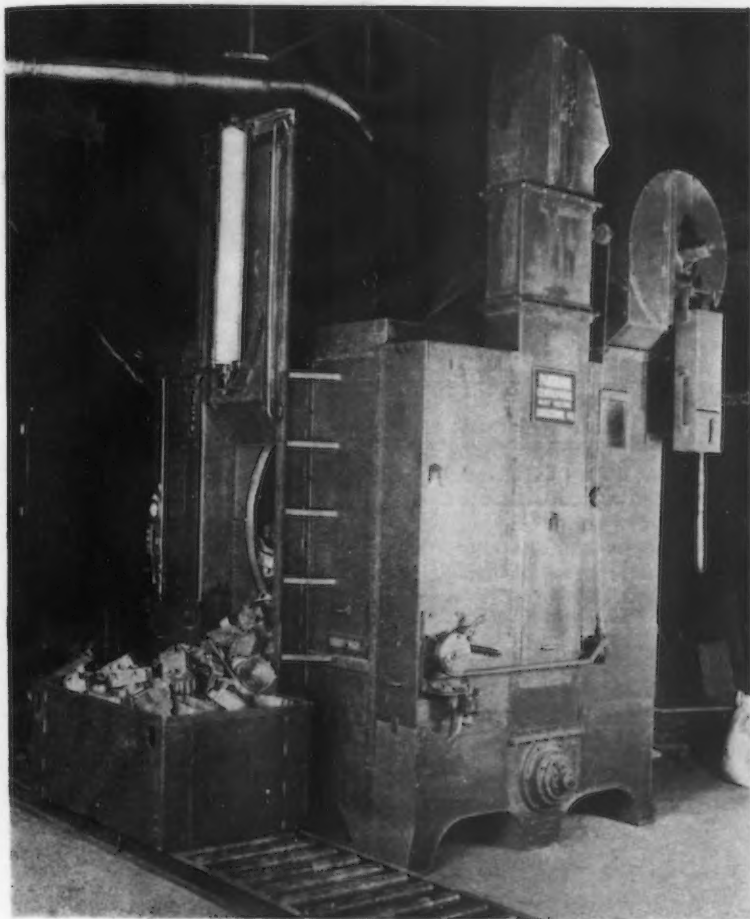
ABOVE

THE expanding adoption of electrical control over machine tool units is well illustrated in a new and smaller machine in the Bullard Multi-Au-Matic line. The machine is described on page 39.



ABOVE AND AT LEFT

A PALLET system for loading, handling, storing, and shipping a wide variety of products and units is outlined on page 43. The use of pallets and skids from loading point to point of use-destination is growing in favor. This truck, by Elwell-Parker, Cleveland, features this system and covers a wide range of industrial material's handling.



ABOVE

NEW blast-cleaning equipment utilizing an abrasive stream created by a revolving wheel is said to eliminate necessity for compressed air force in gaining abrasive action. See page 43.

BELOW

THE heavy-duty milling cutter shown in action here and covered in the text on page 43 is now included in the equipment line of the Ingersoll Milling Machine Co., Rockford, Ill.



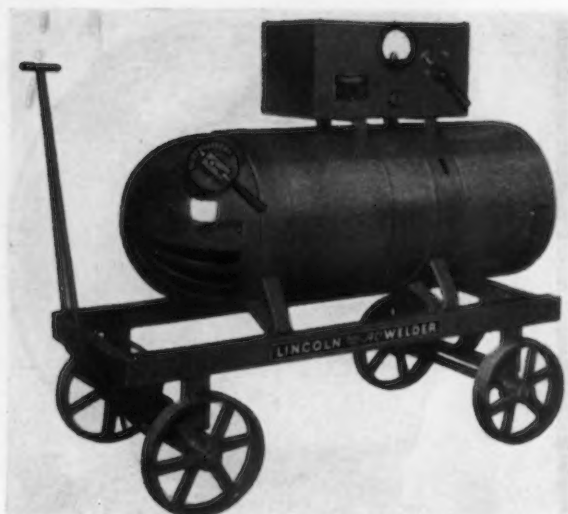
ABOVE

SEVERAL features are incorporated in a balancer for portable tools which is described on page 43.



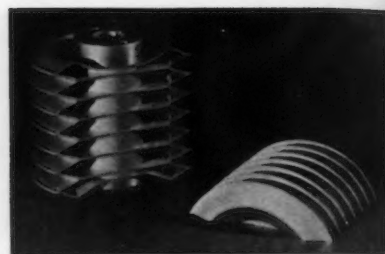
ABOVE

WORM-type powered gear is used as a hoist unit in an application announced by Foote Brothers Gear & Machine Co., 5301 South Western Boulevard, Chicago. A solenoid brake is featured. See page 43.



AT LEFT

THIS new "Shield arc a.c." welder is built in both portable and stationary models. In appearance and size it is almost identical with a d.c. model which is also a product of the Lincoln Electric Co., as noted on page 44.

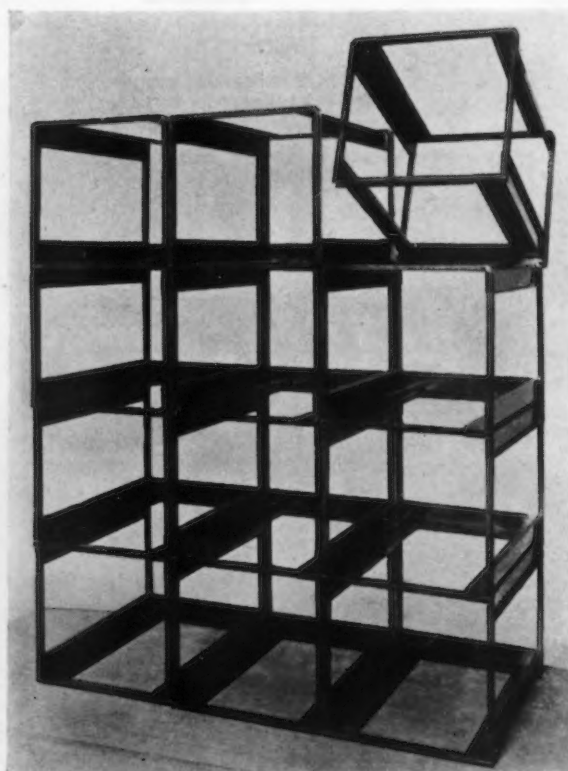
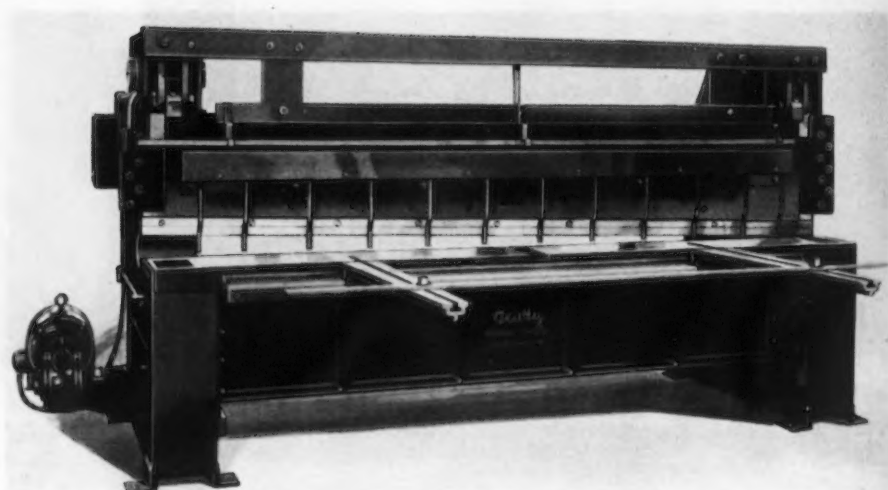


ABOVE

NEW design is adopted for the reinforcement of the walls of this sheave, which is referred to on page 43. Other strength features incorporated in previous models are retained.

AT RIGHT

ALL working parts of this shear are fully inclosed. Cutting action is by push button control rather than by foot treadle. No flywheel is employed. The design provides for clear view of the work to be cut. Further reference to the equipment is made on page 43.

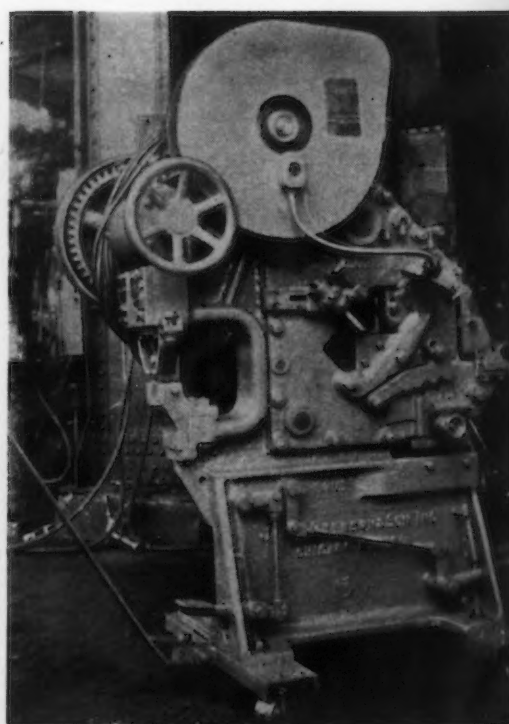


AT LEFT

ON page 43 the details of provision for keeping stock containers in proper rack position are given. The method used in locking the sections is also described.

AT RIGHT

THIS portable, cast steel equipment for punching, plate and bar shearing, angle and tee cutting, angle mitering, coping and notching can be furnished in several capacities by the makers, Joseph T. Ryerson & Son, Inc., Chicago.



Industrial Truck Features Pallet-Load Transportation

THE Elwell-Parker Electric Co., Cleveland, is in regular production of a new Tiering Fork Truck pictured on page 40.

The equipment contemplates the use of flat wooden pallets on which are loaded the containers or the units to be transported. The inexpensive feature of the pallets, permits of their loaded shipment to points of destination where they may be re-used or discarded.

The trucks are either gas or electrically powered. The rated capacity is 4000 lb. to 7000 lb. Travel speed 6 to 12 miles per hr. The gasoline power plant develops 33 hp. at 1250 r.p.m. A transmission safety lock, combined with the tilting column, permits of loading or unloading while stopped on inclined surfaces.

The separate unit hydraulic ram tilts either forward or backward by means of levers. Elevation power is supplied by a cylinder receiving its oil from a heavy-duty, geared hydraulic pump, direct driven from the truck motor. The lowering valve is manually operated. Up or down control at any point of travel, is incorporated.

The forks are both adjustable and detachable. They may be two or more in number or implement elements of other design, suited to special purposes, may be used.

Worm Type Powered Gear Hoist Unit

STANDARD worm type powered gear incorporated in a compact hoist unit is being offered by Foote Brothers Gear & Machine Co., Chicago, and is illustrated on page 41. A solenoid brake is mounted on the extended worm shaft and a grooved drum on the slow speed worm gear shaft. Heat radiating corrugations on the worm housing are specified. Any make and type of motor can be used with nine standard unit sizes. Either horizontal or vertical types are available. Capacities range from $\frac{3}{4}$ hp. to 40 hp.

Centrifugal Blast Cleaning Machine

PANGBORN Corp., Hagerstown, Md., announces a new Centrifugal Blast Cleaning Machine for cleaning various size and shape castings without the use of compressed air. The machine cleans loads up to 18 cu. ft. in bulk and averaging 2200 pounds in weight, in times which vary from 7 to 15 min., depending upon the characteristics of the castings.

The interior of the unit has two revolving drums and a stationary armor plate strip through the center. The action of the revolving drums throw the castings on to this center strip directly under the abrasive stream created by a revolving wheel. In this manner each individual casting is subjected to cleaning on every surface. See page 41.

In operation the loading door is opened and closed by a quick acting, easily controlled cylinder. An electric measured time clock automatically operates a warning signal when cleaning is completed. Abrasive is used over and over again, being thoroughly cleaned and handled by the separator and elevator units built into the equipment.

The design of the machine features low headroom and a low loading point.

Inclosed Shear Has Push Button Control

NEITHER flywheel nor foot pedal is used in the operation of a new all steel plate shear built by the Beatty Machine & Mfg. Co., Hammond, Ind., and shown on page 42. Either single piece or continuous cutting is started by push button. Counter-weights and clutch are eliminated in one model. Much attention has been given to the throat; betterments at this point are emphasized in connection with expansion, deflection, vertical and transverse, and vertical thrust. Rolled steel welded construction is used in connection with steel castings. A number of sizes are available.

New Face Milling Cutters Feature Extreme Duty

HEAVY duty face milling cutters for use in cast iron and steel are now being offered by The Ingersoll Milling Machine Company, Rockford, Ill., and are illustrated on page 41. These cutters are designated as type NB and they are designed to take a full cut up to $\frac{3}{4}$ in. deep. The body or housing is made of an alloy steel forging which is carburized and heat treated and then ground to a high degree of finish and accuracy. High speed steel-serrated blades are used and each blade is held in position by a hardened wedge which is locked in place by a hollow head set screw. All cutters have $\frac{1}{2}$ in. by 1 in. keyways and are driven by two radial keys.

Two optional mounting designs are available, the one for spindle noses

made either to the National Standard for planer-type milling machines, or to the National Standard for knee-type milling machines. Standard type NB cutters are furnished in diameters ranging from 8 in. to and including 16 in. These cutters are being used for cuts $\frac{3}{4}$ in. deep by 11 in. wide in SAE 1020 steel with a feed of 4.32 in. per min. There is no blade movement in the housing, even under such cuts, although 60 per cent of the blade is used up. Lighter cuts can be taken with a remaining 15 per cent of the blade, making a total of 75 per cent blade usage. The blades are ground with 13/16-in. cutting edge on periphery for deep cuts; 1-in. cutting edge on face to insure good finish and 1 $\frac{1}{4}$ -in. projection beyond face of housing to assure adequate chip clearance.

Design Provision Locks Built-Up Rack Members

ADDED to the line of "Stackbin" devices manufactured by the Stackbin Corp., Providence, R. I., is a new "Stackrack" of welded channel and angle steel construction, as pictured on page 42.

In detail, a locked assembly is secured as follows: A lip at the rear of the rack frame on member to be placed in position, and running across the entire width, hooks under the top cross member of the frame beneath (already in position). At the front, a close fitting channel drops over the front cross member of the underneath frame when the new frame member is down-positioned, thus locking.

Texrope Sheave with Reinforced Walls

THE Texrope Division of the Allis-Chalmers Mfg. Co., Milwaukee, Wis., is prepared to supply a new reinforced steel sheave—Duro-Brace, the outside walls of which have a convex steel plate said to give positive protection against distortion. Rim and web welding and the interior grid-type construction of previous units are retained. See illustration on page 42.

Suspended Balancer For Portable Tools

THE Chicago Pneumatic Tool Company, 6 East Forty-fourth Street, New York, announces a new counterpoise for suspending, balancing and lifting portable loads, up to 200 lb. The up and down stopping point is regulated by a mechanically operated Geneva gear, independent of the cable. Throat-type hooks are employed, the upper hook having lateral

adjustment for centralizing cable and object. The unit consists of a tapered drum, single cable and a method of applying spring force from a spring mounted between two ball bearings located at each end of the shaft. The spring is adjustable for load by means of a hardened worm. A free safety latch is said to provide against load dropping, under emergency conditions. Illustration is on page 41.

Journal-Box Unit Has Non-Drip Feature

"STAPAX," a self-contained lubrication unit for any type—standard or special, of journal box is now marketed by the Lubrication Products Co., Cleveland.

The device involves spring action and a wool-felt pad, so assembled, it is said, as to eliminate the need for waste packing.

Production is carried on at the Burgettstown, Pa. plant.

A New Brazing Flux Is Offered

GREATER solvent action on a wide variety of oxides is said to feature increased speed in brazing operations through the use of patented "Handy Flux" announced by Handy & Harman, 82 Fulton St., New York.

The product is sold in paste form, ready for use in the brazing of both ferrous and non-ferrous metals and alloys, and is said to have a low melting point which permits of taking advantage of silver solders and brazing alloys having low flow points.

New A.C. Motor Generator Welder

THE Lincoln Electric Co., Cleveland, announces this new alternating current welder known as the Lincoln "Shield Arc AC." The design is of the motor generator type which takes 2 phase and 3 phase alternating current of standard voltages and frequencies and converts it into alternating current of lower voltage and at that higher frequency most suitable for arc welding with either heavily coated or washed electrodes in all positions. This principle of AC welding, it is said, makes the new type of machine a commercially practical type. See page 42.

The maker suggests comparison on the following points:

(a) Arc characteristics due to the higher frequency, such as more stable arc, less magnetic blow, easier starting of arc.

(b) Weld metal because of lessened spatter loss and in multiple pass welding greater density.

(c) Power characteristics from the line.

The new "Shield Arc AC" welder is built in portable and stationary AC motor driven models in two sizes. The smaller capacity machine can be used for continuous welding with electrodes of 3/32 in. to 5/16 in. in size; the larger capacity welder handles electrodes from 1/8 in. to 3/8 in. in size. The wiring is for 220, 440 or 550 volts, AC supply, 2 or 3 phase, 50 and 60 cycles. In appearance, size and weight the "Shield Arc AC" is almost identical with its companion, the "Shield Arc" machine for DC welding.

Sheet Steel Sales Rose in October

SALES, production and shipments of sheet steel reflected gains in October, according to the report of the National Association of Flat Rolled Steel Manufacturers, Pittsburgh. In this survey, which is based on figures covering a monthly capacity of 325,000 tons, or approximately 59 per cent of the country's total capacity of 550,000 net tons, makers reported sales of 102,920 tons in October, compared with 77,063 tons in September; production of 104,898 tons against 76,051 tons, and shipments of 95,107 tons contrasted with 73,260 tons. Unfilled tonnage on Nov. 1 totaled 77,423 tons, or 23.8 per cent of capacity, compared with 67,062 tons, or 20.6 per cent of capacity on Oct. 1. The October report with comparisons of the two preceding months, in net tons, follows:

	Oct.	Sept.	Aug.
Sales	102,920	77,063	66,064
Production	104,898	76,051	77,197
Shipments	95,107	73,260	77,706
Unfilled orders	77,423	67,062	64,270
Unshipped orders	38,597	35,490	37,314
Unsold stocks	63,667	64,398	71,968
Capacity per month ..	550,000	550,000	550,000
Percentage reporting ..	59.0	59.0	59.0

Percentages, Based on Capacity			
Sales	31.7	23.7	20.3
Production	32.3	23.4	23.8
Shipments	29.3	22.6	23.9
Unfilled orders	23.8	20.6	19.8
Unshipped orders	11.9	10.9	11.5
Unsold stocks	19.6	19.8	22.1

Directors of the Association of American Railroads at a meeting in Washington adopted recommendations of the general committee, mechanical division, which provide that on and after Jan. 1, 1945, all freight cars interchanged between the various railroads must be equipped with airbrakes embodying improvements that have been developed as a result of a long series of elaborate tests and research work conducted in behalf of the railroads of this country through the American Railway Association.

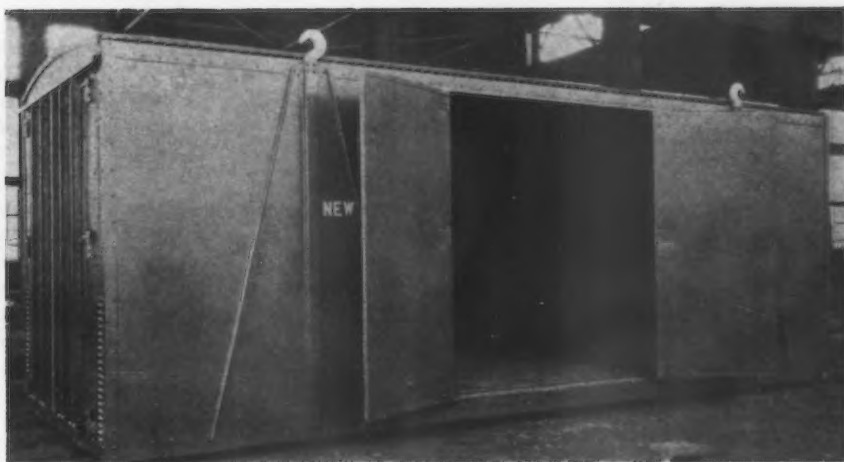
New Handbook on Cemented Carbides

THE interest in and growing use of cemented carbides as applied to metal cutting add value to a handbook about to be released by Thomas Prosser & Son, 15 Gold St., New York. It is an interesting presentation of photographs, drawings and tables, and covers the following: Method of manufacture; salient characteristics; advantages to be obtained through the use of Widia products, for which the Prosser company is agent; various grades obtainable, and their applications; recommendations regarding the modern methods of use of the cemented carbides; proper tool design; practical application of the metal cutting theory; the advantages to be obtained from high speeds possible with cemented carbide tools; recommended grinding procedure; brazing instructions, and how to make cemented carbide tools.

The handbook has 24 pages, 8 1/2 by 11 in. in size.

Do the industrial codes in their present form promise to insure economic stability? This question is ably answered in the book, "Codes, Cartels, National Planning," by Bruno Burn, recently published by McGraw-Hill Book Co., Inc., New York. Backed by an extensive practical experience with cartels and trade associations abroad, Dr. Burn gives an authoritative analysis on how the disadvantages of cut-throat competition and industrial over-expansion can be effectively checked without leading to suppression of small business and the exploitation of the consumer. Also described is the method of the cartels in Europe in solving the problems of price fixing, selling below cost, and regulation of production and marketing. Dr. Burn also devotes considerable effort to figuring out whether national planning is compatible with the basic economic and political institutions of America.

"Die Castings," a new book by Herbert L. Chase, published by John Wiley & Sons, Inc., New York, deals primarily with the product, its compositions, uses and designs, rather than with the methods followed in its production. This book supplies information such as is needed by purchasers, including those in charge of designs, specifications, production and buying. It tells purchasers how die castings can be advantageously applied to components of various products, what alloys are used in their construction and why, how the castings should be designed, how to specify and test them, and finally how they can be finished. This book represents a composite of information drawn from experts on each subject.



The use of pressed steel forms in hook channels and diagonal bracing members has helped to reduce weight in this type of demountable container.

Demountable Steel Containers for Transfer From Freight Car to Motor Truck

By T. H. GERKEN

News Editor, THE IRON AGE

USE by the railroads of demountable containers capable of transfer from car to truck is referred to frequently by Joseph B. Eastman, Federal coordinator of transportation, as a potential aid to railroad rehabilitation. The idea is not entirely new. Demountable truck bodies of this type have been used successfully for 15 years, but only recently have they received the attention they deserve. One of the pioneers in the field was the Motor Terminals Co., 420 Lexington Avenue, New York, which has been very active in the Cincinnati area. This company has not only developed a practical container unit of approximately 1000 cu. ft. capacity, but has also devised methods of handling such units by means of cranes with a minimum investment in new equipment.

Other companies advocate the moving of container units from car to truck and within warehouses by means of castors or skids, while the use of lift trucks is recommended as being especially adaptable to types of freight subject to storage in containers.

Final Purpose the Same

While exponents of the demountable container idea may differ as to the best method of moving the particular units which they recommend, they are in general agreement regarding the basic purpose. The greater trip-mile

and ton-mile capabilities of dump trucks as compared with trucks of the stationary body type used in all conventional merchandise service have been definitely established by comparative cost analysis of truck fleet operations.

Ordinary commercial trucks are normally idle about 50 per cent of their working time, with tailboards frozen to the platforms of either carrier or shipper, discharging or receiving merchandise loads. The same problem is not encountered in dump trucks designed primarily for commodity service, even though the same truck chassis are subject to the same fixed expense. Consequently the demountable body was devised with the idea of making possible unit interchanges of merchandise loads in the time and at a cost comparable with interchanges of commodity loads.

Much Surplus Equipment Formerly Required

In view of the fact that equipment for many classes of freight is non-utilizable in other services and that, in many instances, the classification

for which it was designed and provided offers but seasonal movement, it is apparent that the rail carriers, in order to retain their traffic, "hold the investment bag" against problematical traffic demands. Much of this equipment is so specialized, insofar as superstructure is concerned, that it is not adapted to the transport of diversified products. Some superstructures may be used specifically for industrial, agricultural or mineral requirements, according to their design, but the substructure, running gear or chassis is subject to American Railway Association standards and is generally uniform.

If such running gear could be universally employed in all types of service and relieved of demurrage delays on arrival at each destination, being made available for return hauls within 12 to 24 hr., a reduction of approximately 50 per cent in the running gear investment of all rail carriers could be made. For, regardless of per diem and demurrage receipts, it is just as uneconomic to freeze a rail car with an approximate capital expense of \$2,500 for indefinite storage purposes under non-productive cumulative demurrages, as it is irrational to utilize a heavy duty motor truck of approximately 150 cu. ft. platform area, at an approximate investment of \$5,000 in addition to licensing cost, taxation, amortization and driver's

expense, for a freight rehandling and sorting platform.

Approximately 75 per cent of all commodities now carried by the railroads could be transported in truck bodies, 20 to 24 ft. long, supplied and operated under existing tariffs. The same body could be utilized as a segment of a box car in rail haul and as a unit of a truck or semi-trailer in terminal haul. The same under-frame, roofs and entire body skeleton can be utilized for detailed completion to accommodate live stock, poultry, cold storage products, grain, coal, lime, cement, etc. The box car of 2500 cu. ft. capacity was designed and created to meet the industrial long haul, wholesale demands of the country, but the smaller unit of approximately 1000 cu. ft. is becoming widely popular as a trucking unit.

Various Types of Bodies Tried

In developing a satisfactory demountable body, the Motor Terminals Co. has experimented with 10 or 12 different types, having begun with demountable truck bodies in 1917. Upon undertaking rail haul service four years ago, it was necessary to develop a new type of truck body, light enough to be economically truckable under wheel weight restrictions, and strong enough to resist the impacts of shifting consignments during hump classification, impact and twisting forces.

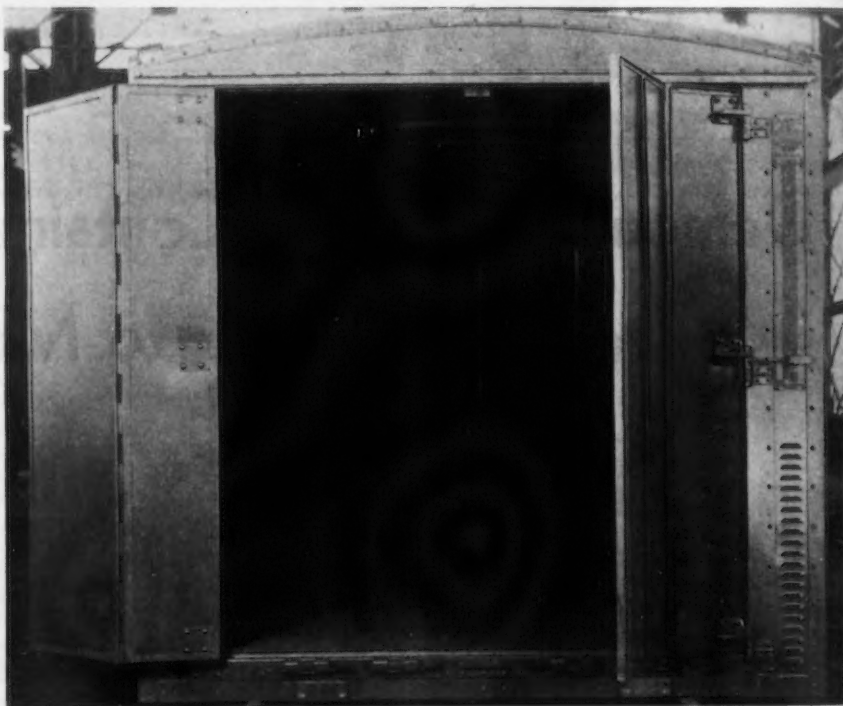
In the latest type of all-steel body built, the fundamentals of the company's original design are still being adhered to, and it has been found un-

necessary to make changes in either the sub-frames or roofs. Structural members, however, have been replaced by steel stampings wherever possible. The details of construction and the layout of material make possible multiple punching without set-up changes for the sake of production economies.

As shown in the illustrations, the side frames are reinforced by pressed steel hook channels, and U-shaped diagonal bracing is employed to increase rigidity and decrease weight. A 3/16-in. eaves member has replaced a

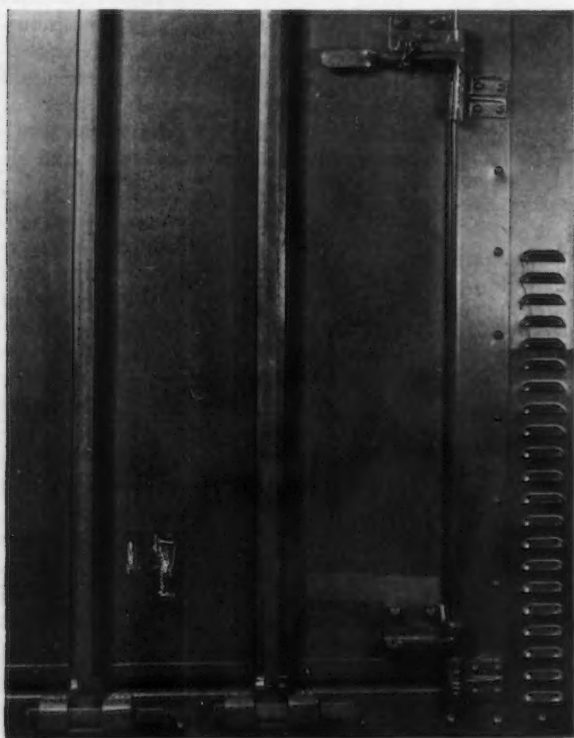
lighter section formerly used. The roof is of arched corrugated sheet steel, and in order to increase atmospheric pressure within the body, tightly-packed mineral wool has been used in outlet louvres at the eaves. This strains the air of hot cinders and also permits the outward flow of hot air which is replaced by a larger amount of cold air through the inlet ducts, thus increasing atmospheric pressure within the body.

The side doors are solid panels of truss plate construction with com-



ABOVE

The end doors of this all-steel container, developed by the Motor Terminals Co., are made of overlapping steel sections, mating the bottom of the door with the floor of the body, and are hung on cam elevating and lowering hinges.



AT LEFT

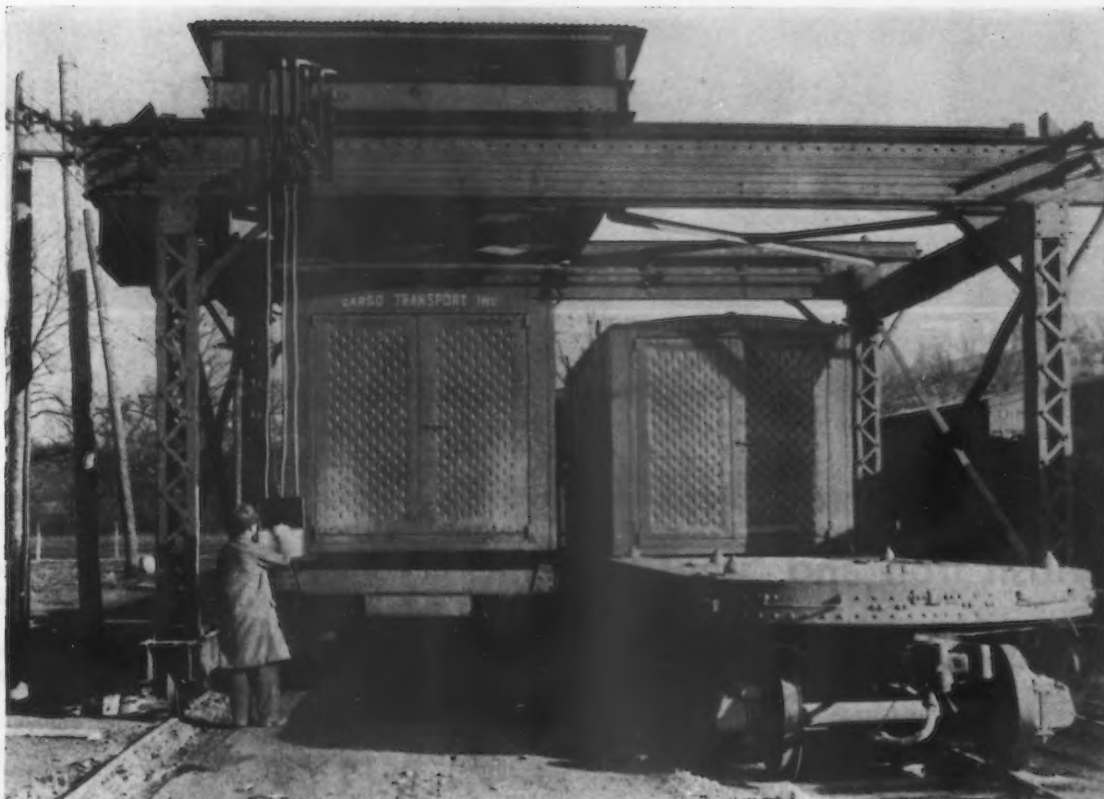
Reinforcement of the end doors of the Motor Terminals containers is accomplished with four T-rail detachable chock bars. Their method of attachment is shown in this picture.

pressed marine glue and cork filler. The end doors are made of overlapping steel sections, mating the bottom of the door with the floor of the body and are hung on cam elevating and lowering hinges. Additional reinforcement of the end doors is accomplished with four T-rail detachable chock bars at each end of the body, the rails being attached at crane for the rail haul and detached at destination for truck haul. When they are detached, the maximum weight of the body is reduced by 230 lb. for trucking. The door locking design is composed of a heavy sealing bar, built up of four angles with two telescopic bottom bolts and held in place by gravity eccentrics which permit sealing and padlocking by carriers and shippers.

Male and female anchorages are employed exclusively, the latter being built into the body. In actual operation, cars have been derailed at speeds of 35 to 40 miles per hr. and bodies have remained firmly seated. Detach-

AT RIGHT

This roadway surface mechanism has been developed for loading at places where the clearance is limited. Trucks may back into such a runway without interference.



BELOW

The special track and locking equipment required in the Roloff method of transferring demountable containers by means of castors is shown in this illustration.



able body hooks permit quick field repairs in case of bending.

A buffer device has lately been developed which provides for spring mounting of the standard female anchorage in the subframe of the body in order to cushion rail haul impacts. It is believed that the spring longitudinal action provided for will relieve abuse to consignments and end strain on body and doors. As the device is built into the body, expensive attachments to existing railroad flat and gondola cars are unnecessary.

Lighter Flat Car Designed

In order to further the use of its proposed equipment, the Motor Ter-

minals Co. has suggested the design for a flat car especially suitable to demountable bodies. The total weight of the proposed car carrying two 20-ft. demountable bodies is 46,000 lb., estimated as follows:

	Lb.
Underframes	15,000
Two 50-ton trucks.....	15,600
Two demountable bodies..	12,400
Couplers, draft gear and brake rigging.....	3,000
Total weight, light....	46,000

The car would have a box girder center sill with outriggers at predetermined locations for attachment of male anchorages to accommodate the female anchorages of demountable

bodies. The outriggers have longitudinal channel side sills. If the car were to be hauled without bodies, the width of the center sill is adequate to provide suitable runway for trainmen.

The underframe of the car is designed to carry two 20-ft. truck bodies, loaded each with 35 tons of freight or a total pay load of 70 tons. The conventional box car, with a 40-ton capacity, weighs 50,000 lb. It can be seen that the pay-load ratio is considerably increased by the new design.

Advantages of Crane Transfer

The Motor Terminals Co., in advocating the use of cranes for transfer of bodies, believes on account of past operating experience that the crane-way, from an investment standpoint, is much cheaper per 100 sq. ft. of floor area than would be the shoring up of the old floor area to sustain the same concentrated load weight on castors or other surface moving devices. The chief argument against the use of cranes is that of capital expense, which is to be expected with any operating proposals embodying revisions of existing plant either of carrier or of shipper. A review of the company's experience at the Cincinnati Terminal indicates the expense problems which were involved and the ways in which they were met.

In 1919 the Motor Terminals Co. made an agreement with all the rail-
(Continued on Page 78)



Seasonal Factors Not Affecting British Iron and Steel Demand

LONDON, ENGLAND, Dec. 3 (*By Cable*).—Traders are prepared for the usual seasonal slackness and stocktaking, but no signs of inactivity are yet evident. Home demand for pig iron is keen, and more foreign inquiries are appearing. Additional furnaces are being blown in this month. Demand for hematite has increased and stocks are being drawn upon.

Semi-finished steel is more quiet as consumers are well covered, but works

are busy and only a few orders are going abroad.

Large contracts are being booked for finished steel. Rail mills are busy and the construction trade is taking increasing tonnages.

The shipbuilding outlook is brighter. The Government is to grant a £10,000,000 subsidy to encourage the scrapping of old and the building of new ships and a one-year subsidy of £2,000,000 for tramp shipping.

Home trade in tin plate is active with bookings made for delivery well into next year. There is a fairly widespread export demand excepting in Far East.

The Continental iron and steel market is dull owing to seasonal conditions, and buyers are awaiting clarification of the political outlook and the results of the Saar plebiscite. Merchant steel is fairly active. Semi-finished steel is more quiet. Japanese demand is disappointing because of American and Polish competition.

The broad flanged joist cartel reports business very unsatisfactory, despite disappearance of outside competition.

a gain of 2.5 per cent in the daily rate of pig iron production; responding to this activity the daily rate of coke production at furnace plants increased 2.7 per cent, while the rate at merchant plants increased 3.7 per cent.

Of the 91 by-product coke plants in existence at the beginning of 1934, 81 made coke during October, 63 were recovering ammonia in the form of ammonia liquor or sulphate, and 52 were making benzol or motor benzol.

Beehive coke production made a further advance during the month, the daily rate of 2811 tons showing a gain of 28.2 per cent over that of September.

Stocks at by-product plants continued to rise, the total on hand at the close of October amounting to 3,081,246 tons, or 8.3 per cent in excess of September's reserves.

October Steel Payroll 12 Per Cent Higher

PAYROLLS of the steel industry were higher by \$3,581,017 in October than in September, an increase of more than 12 per cent, according to the American Iron and Steel Institute. The month's payrolls totaled \$32,723,909, as against \$29,142,892 in the preceding month. Although steel operations in October were 50 per cent less than a year ago, last month's payrolls were only 17 per cent less than in October, 1933, when the total was \$38,334,978.

The total number of employees in the steel industry in October, 1934, was 381,431, about the same as September's total of 381,828. During October, 1933, the industry employed 416,277.

Average number of hours worked per week by employees in October, 1934, increased 11 per cent from the month before. Employees averaged 26.8 hr. per week in October, compared with 24.2 hr. in September and 32.1 in October, 1933. Average earnings per hour for all employees were 72.3c. in October, 1934; 73.8c. in September, 1934; and 64.8c. in October, 1933.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton	
Ferromanganese, export	\$9
Billets, open-hrth.	\$5 10s. to \$5 15s.
Tin plate, per base box	*18s. 2d.
Steel bars, open-hearth	\$7 17½s.
Beams, open-hrth.	\$7 7½s.
Channels, open-hearth	\$7 12½s.
Angles, open-hearth	\$7 7½s.
Black sheets, No. 24 gage	\$9 5s.
Galvanized sheets, No. 24 gage	\$11 5s.

*To March 1; 18s. 5d. thereafter.

Official Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £	
Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange	
Billets, Thomas	\$2 7s.
Wire rods, No. 5 B.W.G.	\$4 10s.
Steel bars, merchant	\$3 5s.
Sheet bars	\$2 8s.
Plate, ¼ in. and up	\$4
Plate, 3/16 in. and 5 mm.	\$4 2s. 6d.
Sheets, ½ in.	\$4 7s. 6d.
Beams, Thomas	\$3 2s. 6d.
Angles (Basic)	\$3 2s. 6d.
Hoops and strip base	\$4 2s. 6d.
Wire, plain, No. 8	\$5 7s. 6d.
Wire nails	\$5 15s.
Wire, barbed, 4-pt. No. 10 B.W.G.	\$8 15s.

By-Product Coke Production Rises

AFTER four months of declining activity, the downward trend of coke production was halted during October, the daily rate of output at 77,548 tons per day being 3.8 per cent higher than that of September. In spite of this gain, however, the October rate was 26.4 per cent below the 1934 peak record of May.

Output of by-product coke for the 31 days of October amounted to 2,316,858 tons, or 74,737 tons per working day, as compared with a daily rate of 72,492 tons in September and 83,285 tons in October, 1933. Expanding blast furnace operations resulted in

Malleable Castings Output Up; Fabricated Plate Orders Higher

WASHINGTON, Dec. 4.—Production of malleable castings rose to 25,317 tons in October from 21,541 tons in September, according to the Bureau of the Census. Bookings declined to 18,785 tons from 19,511 tons.

Orders for fabricated steel plate in October totaled 15,452 tons.

October steel barrel production, according to reports by 31 manufacturers, was 583,255 units, compared with 412,592 in September and with 873,536 in October last year. Shipments in the same respective periods were 575,281, 417,114 and 863,277 units, while unfilled orders had declined to 492,297 barrels on October 31, from 641,283 units on Sept. 30.

Porcelain Enameling Group to Increase Activity

AT the second quarterly meeting of the educational bureau of the Porcelain Enamel Institute, held in Columbus, Ohio, Nov. 16, Richard H. Turk, chairman of the technical research section, presented an outline of proposed activities for his section. Included in his comprehensive list of projects, some of which have already been assigned to committees, were standardization of terms, under the direction of Prof. A. I. Andrews of the University of Illinois; standardization of tests, under W. N. Harrison of the Bureau of Standards, and design and fabrication of porcelain enameled articles, under B. T. Sweeley, Chicago Vitreous Enamel Products Co.

The industry contact section, head-

ed by Earle S. Smith as chairman and R. A. Weaver as vice-chairman, presented a plan of education through demonstration and contact with the retail salesmen of porcelain enameled products. Comprehensive plans call for department store demonstrations, programs for sales meetings, and, wherever possible if the size of meetings warrant it, presentations to the general public.

Orders for steel boilers in October totaled 696 units with 415,713 sq. ft., compared with 626 with 539,242 sq. ft. in September, according to reports received by the Bureau of the Census from 68 identical manufacturers. In the 10 months ended with October, orders were placed for 4231 boilers with 3,822,066 sq. ft., compared with 3494 boilers with 4,222,828 sq. ft. for the corresponding period of last year.

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Objects to Freight Rate Increases

PROTEST against what was characterized as "another tax on business" estimated to run into millions of dollars a year, was entered before Clyde B. Aitchison, of the Interstate Commerce Commission, at the Hotel Sherman, Chicago, on Nov. 20, by Walter R. Scott, vice-president of the National Industrial Traffic League,

and past chairman of its bill of lading committee.

Commissioner Aitchison was in Chicago taking evidence of shippers on the proposal of the railroads to make a horizontal increase in freight rates, and also to raise charges for certain accessorial services, and to inaugurate charges on others hitherto furnished as part of the regular transportation service.

Mr. Scott objected to the proposal to institute a charge of \$1 for the issuance of each order bill of lading.

"We have no way of estimating just how large a tax this proposal will put upon American business," said Mr. Scott, "but we have estimated that it will amount to considerably over \$3,000,000 on grain alone. And this charge will have to be borne by business directly, for there is no way either to pass it back to the producer or on to the consumer."

Machine Tool Show to Be Held in September

ANNOUNCEMENT has been made to the members of the National Machine Tool Builders' Association that the 1935 Machine Tool Exposition will be held Sept. 11 to 21, inclusive. Applications for space for exhibits will be taken early in December.

Henry P. Rees, New York, dealer in iron and steel products, has removed his offices to 50 East Forty-second Street.

Altamont, Ill., will take bids on Dec. 18 for a waterworks plant to be financed by a \$41,000 PWA loan and grant, which will require 12,900 ft. of 6-in. cast iron pipe. Pumping equipment includes two 150 g.p.m. low-service and one 350 g.p.m. high-service motor-driven pumps.



AVAILABLE for experimental service across the Pacific Ocean, this transport plane just completed by the Glenn L. Martin Co., Santa Monica, Cal., is capable of carrying 50 passengers. It is the first of three to be built and will be placed in service by Pan-American Airways. The plane's four motors are rated at 3200 hp. and will be able to carry a 25-ton load at a speed of 2½ miles per minute.



Government Moves Against Houde Company

Will Test Right of Majority to Bargain Collectively for All Employees in Case Against Buffalo Concern

WASHINGTON, Dec. 4.— Determination as to whether a minority of workers has the right to bargain collectively with their employers or whether such a right rests exclusively with the majority was promised a test when the Department of Justice filed a bill of complaint against the Houde Engineering Corp., Buffalo, in the United States District Court of the Western District of New York.

The issue is identical to that which brought about a break between the iron and steel industry and the American Federation of Labor. The appeal of President Roosevelt for a capital-labor truce resulted in negotiations looking to this end being taken up by the National Steel Labor Relations Board. The steel industry offered to recognize and deal with union leaders in their official capacity but declined to sign union contracts or to deny non-union workers the right of representation. President M. F. Tighe of the Amalgamated Association of Iron, Steel and Tin Workers is understood to have been agreeable to the truce. His hand was forced, however, by President William Green of the Federation, it is reported, and the truce negotiations collapsed.

To Speed Case

The Government is making efforts to speed the Houde case, involving, as it does, court interpretation of the much-discussed Section 7-a of the National Industrial Recovery Act. Joining in the case "as a friend of the court," the American Federation of Labor, through Charlton Ogburn, also counsel for the Amalgamated Association of Iron, Steel and Tin Workers, is preparing a brief, which, Mr. Ogburn said, would be "broader" than

By L. W. MOFFETT

Resident Washington Editor, THE IRON AGE

the department's complaint. Apparently concerned lest the Government has left a loophole in its bill, union officials say they will seek a court order directing recognition of the majority union as the exclusive agency to bargain collectively for all workers employed at the Houde plant. Favorable court decision, if made, would of course be a precedent for establishing the principle of majority representation for the exclusive right of bargaining in all labor negotiations unless specifically provided for otherwise in individual agreements.

In the Houde case, the Department of Justice alleges the failure of the company to deal collectively with the United Automobile Workers' Federal Union No. 18839, an affiliate of the American Federation of Labor, concerning matters of wages, hours and basic conditions of employment, as the exclusive bargaining agency of the employees. Request is made for a court order directing the company to meet and bargain with this union "and endeavor in good faith to reach an agreement; and be enjoined from meeting and bargaining with any other person or organization." This union was held by the National Labor Relations Board to have had the right of exclusive bargaining as the result of an election the board supervised, at which the Federal union got 1105 votes and the Houde Welfare and Athletic Association 674 votes.

Organized labor, in rushing into the case, affects to be concerned over

the department's use of the phrase "or any other group" in speaking of demands of the Federal union to bargain with the Houde company. Both labor board officials and department officials discount organized labor's interpretation of this phrase as possibly permitting minority representation. It is doubted that the union officials are afraid of any loophole but rather made the point in order to participate in the case.

Justice Department at First Hesitant

When the Houde company did not heed the decision of the National Labor Board, the latter succeeded in having the compliance division of NRA remove the company's Blue Eagle but found a hesitant Department of Justice when the board asked the department to institute proceedings. The department on the first occasion declared sufficient evidence to warrant action was lacking. Then union officials presented affidavits and the department still held back. Not until Francis Biddle, new chairman of the board, took up his duties was the case again pressed before the department, resulting in the filing of the suit. There have been reports that the department itself has not been in agreement with the Labor Board's interpretation of Section 7-a and that the case was decided upon as a means of bringing the issue to a head.

Richberg's Views on Labor

Donald R. Richberg has been the object of vigorous attack by President Green of the American Federation of Labor for the former's interpretation of the section. Mr. Richberg, director of the National Emergency Council, able lawyer and former head of the NRA Legal Division and formerly at-

torney for railroad unions, has, in effect, held that workers not participating in an election are not required to abide by collective bargaining agreements made by majority representation.

"No one," Mr. Richberg said in a recent address, "has ever been given any authority under the law and I doubt whether anyone could be given legal authority to herd all employees or any number of employees into a voting unit and then compel them to select their representatives by majority vote.

"I submit there would be serious question of the constitutionality of any law which sought to compel men to unite for the protection of their private interests with those with whom they were unwilling to associate."

The ruling in the Houde case itself quotes from the President's executive order setting up the National Steel Labor Relations Board which specifically grants the right to a minority group to present grievances or confer with employers "or otherwise to associate themselves and act for mutual aid or protection."

While efforts are being made to speed the Houde case, it promises to be considerable time before final decision is reached in the event the lower court holds for the Government. For, otherwise, it is assumed the case will be carried to the Supreme Court of the United States. No decision by the highest court could possibly be expected in time to be used by Congress as a basis for labor legislation under the National Industrial Recovery Act inasmuch as the act expires on June 16, 1935. Meanwhile the act will in all probability be considerably revised.

Pennsylvania Railroad Loan Uses Detailed

WASHINGTON, Dec. 4.—Out of PWA loans of \$80,650,000 the Pennsylvania Railroad in the 11-month period ended Nov. 15 ordered materials costing \$29,129,543 for completing electrification of lines between New York and Washington, building 7000 freight cars and 26 electric locomotives and laying new rails, of which 100,000 tons were ordered.

Report of use of the money, required under the contract, was made by the Pennsylvania and has been disclosed by the Bureau of Labor Statistics, Department of Labor, to the PWA which has announced the purposes for which the money went, including reemployment and purchase of materials.

An allotment of \$45,000,000 was made to complete electrification between New York and Washington and \$10,645,583 was spent for materials for this purpose. The job is about 80 per cent completed so far as pas-

senger operation is concerned and nearly 50 per cent completed for freight service. The job of building 7000 freight cars in the company's shops in Altoona, Harrisburg and Pittsburgh is practically completed. PWA allotted \$17,000,000 for this work, for which materials costing \$12,325,455 were ordered. The company has 25 electric locomotives under construction at its Altoona shops.

Materials for these engines were ordered at a cost of \$2,521,004. The company will build 43 more engines in its own shops and has placed orders for 33 with outside shops. An allotment of \$15,000,000 was made for the 101 engines.

With a loan of \$3,650,000 the Pennsylvania purchased 100,000 tons of rails and has laid about one-fourth of them.

NRA and Federal Trade Commission Reports on Basing Point System Ready

WASHINGTON, Dec. 4.—Although efforts are being made to reconcile the widely differing views of the Federal Trade Commission and the National Recovery Administration on the basing point system in the iron and steel industry, it is understood that the commission has sent its report to the White House. The NRA report is being withheld to determine whether the President wants the two reports coordinated and submitted to him when he returns to Washington from Warm Springs, Ga. He is expected back in Washington during the present week.

A joint study by the two government bodies on the basing point system was asked for by the President on May 30 in an executive order which accompanied his approval of the revised steel code. The commission apparently placed a different interpretation on the order from that of the NRA. While ostensibly the two bodies collaborated in the work, it was well known that each was making its own study independently of the other; apparently for this reason the commission on completing its work last week submitted its report to the White House.

The NRA, according to W. Averill Harriman, interpreted the President's order to mean that NRA and the commission should cooperate on the study and coordinate the work of the two bodies so far as possible before sending a report to the President. To this end the NRA inquired of Donald Richberg, director, National Economic Council, assigned to the task of coordinating Government bureaus, if the NRA and commission should cooperate in the study before reporting to the President.

Meanwhile the NRA report, also completed last week, is being withheld awaiting determination by the President as to whether he wants to accept the reports independently or as a joint study. The President in his order asked that the study be completed within six months and the work

was finished within that time, having been finished by Dec. 1.

Formerly Differed Widely

While it is understood that NRA and the commission did exchange reports, the two Government bodies in the past differed widely on the basing point system, and, as was to be expected, they are reported to have shown a sharp variance in connection with the present study. The NRA has upheld the multiple basing point system, though holding it should be subject to expansion. The commission, on the other hand, ever since it instituted proceedings in the Pittsburgh plus case, has held out for the f.o.b. mill system of quoting prices and it has been reported that recommendations made in its report urged the adoption of such a system. It is even reported that it might ask for legislation to enforce such a system. In view of the differing views, it is doubted that a joint report could possibly be agreed upon between the two bodies unless NRA has changed its views, which is held to be improbable.

Both Reports Elaborate

The NRA report, like the commission report, is elaborate, and though each is being carefully guarded before being made public by the President, both are known to carry many illustrations and maps. It is assumed that the President will make the reports public soon, although this has not been confirmed. The NRA study was made under the direction of Dr. J. M. Clark of Columbia University by a staff of legal and economic advisers of the NRA. The commission report is said to have been prepared under the direction of Chief Counsel Healey and Dr. G. A. Stephens and Hugh E. White, economists.

The American Electro-Platers' Society will hold its twenty-third annual convention at Bridgeport, Conn., Jan. 10 to 13. T. H. Chamberlain, 797 Orange Street, New Haven, Conn., is secretary and treasurer.

New Methods of Quoting Wire Rods and Bale Ties

WIRE rods, effective Dec. 1, are being quoted in two forms, i.e. common wire rods and combination wire rods, for which there are separate base prices.

Common wire rods are defined as hot-rolled steel products round in shape produced only by the double or multiple strand method on a rod mill in sizes of No. 5 gage to 15/32 in. in diameter, both inclusive. In straight lengths of sizes over 5/16 in. in diameter these products are bars.

Combination wire rods are defined as hot-rolled steel products round in shape larger than 15/32 in. in diameter up to and including 47/64 in. in diameter. In straight lengths these products are bars.

The prices of common wire rods are unchanged from the previous quotations on hot-rolled wire rods. Prices thus far filed for combination wire rods, effective Dec. 10, are \$40 a gross ton, Pittsburgh or Cleveland; \$41, Chicago; \$46, Galveston, Tex.; and \$49, San Francisco.

Various changes in the extras on wire rods, effective Dec. 1, include the following: The omission of extras of \$3 and \$4 a ton for cold heading quality and the omission of extras of \$5 and \$10 a ton for hexagon rods 1/4 to 15/16 in. and square rods 1/4 to 7/8 in.; the inclusion of a new extra of \$18 a ton for silicomanganese spring steel SAE 9250 and 9260; and the restriction of the extra of \$6 for straightening and cutting in lengths 2 ft. and longer to sizes No. 5 gage to 5/16 in. inclusive.

Bale ties and poultry fence are now quoted on a length basis instead of per net ton. The new prices, which were filed with the American Iron and Steel Institute to become effective Dec. 1, are for the following basing points: Pittsburgh, Cleveland, Chicago, Birmingham, Duluth, Minn., Mobile, Ala., New Orleans, La., Lake Charles, La., Beaumont, Tex., Orange, Tex., Houston, Tex., Galveston, Tex., Corpus Christi, Tex., and Pacific Coast ports.

War Department Opens Machine Tool Bids

WASHINGTON, Dec. 4.—The Ordnance Department of the War Department today concluded its fourth and final opening of bids for a machine tool list totaling approximately \$2,300,000 for arsenals and field service stations. Awards made so far aggregate \$470,856 and have been distributed among 47 manufacturers.

Among the larger awards made are the following: New Britain-Gridley Machine Corp., two screw machines, \$13,751; Brown & Sharpe Mfg. Co., automatic screw machines, \$72,220; Cleveland Automatic Machine Co., automatic screw machines, \$33,938; Cincinnati Bickford Tool Co., radial drills, \$23,505; Pratt & Whitney Co., vertical shapers, \$17,580; G. A. Gray Co., heavy duty planer, \$13,945; Gisholt Machine Co., six turret lathes, \$43,390; Acme Machine Tool Co., turret lathes, \$28,677; Warner & Swasey Co., turret lathes, \$33,634; Marshall & Huschart Machine Co., automatic gear hobbing machine, \$16,566; Hall Planetary Machine Co., two thread milling machines, \$12,810; Hanson-Whitney Machine Co., external and internal universal thread hobbing machines, \$16,527, and Surface Combustion Co., heat treating unit, \$30,921.

Decry Code Curbs on Output

CODE restrictions on machinery and production are retarding industrial progress, the capital goods industries committee of the American Society of Mechanical Engineers declared in a report made public on the eve of its annual meeting, Dec. 3, in the Engineering Societies Building, New York.

The report, based on a study of 503 codes, adds that "the continuance of restrictions of this type is not in the public interest nor conducive to healthy industrial development."

The report holds false the theory that overproduction caused the present economic depression. The committee believes that distribution was at fault.

Referring to code restrictions on machinery and production, the committee says:

How much these requirements have hampered American industry during the past 21 months cannot be determined. The situation revealed by the report justifies this observation; if restrictions like those presented had prevailed in American industry during the first quarter of this century, much of the industrial progress, and the rise in the standard of living that came therefrom, would never have been enjoyed.

The committee making the study comprised Ralph E. Flanders, president, Jones & Lamson Machine Co., Springfield, Vt., president of the society and a member of the Business Advisory and Planning Council appointed by Secretary of Commerce Roper; L. P. Alford, New York, who was a member of the Hoover Committee on the Elimination of Waste in Industry; W. W. Macon, of THE IRON AGE, and L. W. Morrow, of *Electrical World*.

Navy Department Awards Steel

WASHINGTON, Dec. 4.—Awards have been made by the Navy Department of 4419 tons of plates and 1647 tons of shapes for eight destroyers to be built at navy yards, three at Norfolk, Va., two at Boston, two at Puget Sound, Wash., and one at Mare Island, Cal. The plate requirements consisted of 2287 tons of galvanized and 2132 tons of plain material.

The galvanized material, in tons, was distributed as follows: Joseph P. Cattie, 782; Central Iron & Steel Co., 1027; Penn Galvanizing Co., 545; Alan Wood Steel Co., 212; American Sheet & Tin Plate Co., 405. The plain material was awarded as follows: Youngstown Sheet & Tube Co., 738; Alan Wood Steel Co., 320; Lukens Steel Co., 202; Carnegie Steel Co., 187. The entire plate tonnage was awarded by lot drawing.

The shape requirements consisted of 826 tons of plain and 821 tons of galvanized material. Awards were made as follows: Phoenix Iron Works, 340 tons, of which 140 tons was galvanized; Columbia Steel Co., 168 tons, of which 90 tons was galvanized; Carnegie Steel Co., 180; Bethlehem Steel Co., 128, and Joseph T. Ryerson & Son, 240, all plain material, and the following galvanized tonnage: Jones & Laughlin Steel Corp., 118; Penn Galvanizing Co., 10; Ross Galvanizing Co., 89; Enterprise Galvanizing Co., 282, and Joseph P. Cattie, 92. Part of the shape tonnage also was awarded by lot drawing.

Steel Board to Hold Carnegie Hearings

WASHINGTON, Dec. 4.—The National Steel Labor Relations Board will hold an open hearing in Washington tomorrow on petitions of lodges of the Amalgamated Association of Iron, Steel and Tin Workers for elections at the MacDonald, Ohio, and Duquesne, Pa., plants of the Carnegie Steel Co. The testimony will relate to the recent order of the board to determine the interstate character of the company's business. This formality is a prelude to determination as to whether or not the board will order elections to be supervised by it.

It is understood that Eaton Mfg. Co., Detroit Steel Products and Mather Spring Co. are making molybdenum steel leaf springs for Plymouth and Dodge. Mather and Standard Steel Products Co., Racine, Wis., are said to have contracts to furnish springs for Pontiac sixes and eights the coming year.

Iron and Steel Exports Off Sharply — Imports Light

Exports of Iron and Steel from the United States
(In Gross Tons)

	October		Ten Months Ended October	
	1934	1933	1934	1933
Pig iron.....	273	405	2,890	2,260
Ferromanganese.....	41	6	85	33
Scrap.....	147,213	81,187	1,422,627	585,840
Pig iron, ferroalloys and scrap.....	147,527	81,598	1,425,602	588,133
Ingots, blooms, billets, sheet bars.....	5,069	846	14,280	2,897
Skelp.....	2,655	3,769	63,015	18,004
Wire rods.....	483	2,645	19,564	11,605
Semi-finished steel.....	8,207	7,260	96,859	32,506
Steel bars.....	3,133	2,414	33,924	17,212
Alloy steel bars.....	221	196	2,410	1,220
Iron bars.....	40	44	826	441
Plates, iron and steel.....	2,023	2,619	31,728	9,822
Sheets, galvanized steel.....	5,496	9,228	54,711	42,486
Sheets, galvanized iron.....	106	245	1,194	907
Sheets, black steel.....	6,142	5,792	71,149	28,059
Sheets, black iron.....	307	461	3,843	2,027
Hoops, bands, strip steel.....	1,646	1,424	23,729	16,407
Tin plate,terne plate.....	14,793	15,448	154,869	60,620
Structural shapes, plain material.....	2,946	2,393	28,132	12,043
Structural material, fabricated.....	2,653	1,919	17,405	12,394
Tanks, steel.....	1,205	337	5,938	2,170
Steel rails.....	2,053	7,401	58,110	24,907
Rail fastenings, switches, spikes, etc..	570	2,409	14,603	5,968
Boiler tubes.....	703	265	6,657	3,276
Casing and oil line pipe.....	3,183	8,363	54,159	30,336
Pipe, black and galvanized, welded steel	4,260	4,020	37,775	26,929
Pipe, black and galvanized, welded iron	177	154	1,937	1,184
Plain wire.....	2,988	3,420	31,665	15,703
Barbed wire and woven wire fencing..	3,117	2,661	32,016	23,230
Wire cloth and screening.....	56	74	835	588
Wire rope.....	257	258	2,321	1,608
Wire nails.....	887	832	11,140	8,152
Other nails and tacks.....	365	330	4,231	3,299
Other wire and manufactures.....	286	357	4,025	2,279
Bolts, nuts, rivets and washers, except track	394	560	4,174	2,888
Other finished steel.....	180	156	1,514	1,103
Rolled and finished steel.....	60,187	73,780	695,020	375,258
Cast iron pipe and fittings.....	2,253	779	14,192	9,855
Malleable iron screwed fittings.....	293	453	2,544	2,044
Car wheels and axles.....	566	240	4,975	3,253
Iron castings.....	491	255	6,062	2,669
Steel castings.....	304	59	1,994	661
Forgings.....	381	331	3,598	2,579
Castings and forgings.....	4,288	2,117	33,365	21,061
Total.....	220,209	164,755	2,250,846	998,958

Imports of Iron and Steel Products Into the United States
(In Gross Tons)

	October		Ten Months Ended October	
	1934	1933	1934	1933
Pig iron.....	6,682	19,621	105,773	138,986
Sponge iron.....	1	102	796	619
Ferromanganese and spiegeleisen*.....	2,190	5,430	25,601	45,205
Ferromanganese†.....	7	...	74	24
Ferrosilicon‡.....	36	84	674	503
Other ferroalloys§.....	...	...	46	102
Scrap.....	2,009	7,399	32,326	53,743
Pig iron, ferroalloys and scrap.....	10,925	32,636	165,290	239,182
Steel ingots, blooms, etc.....	96	251	1,417	869
Wire rods.....	231	1,735	8,813	11,420
Semi-finished steel.....	327	1,986	10,230	12,289
Concrete reinforcement bars.....	17	85	1,138	2,038
Hollow steel bars.....	60	71	722	753
Merchant steel bars.....	1,456	2,178	15,715	16,736
Iron slabs.....	12	34	699	346
Iron bars.....	10	...	235	191
Boiler and other plate.....	449	638	3,924	7,895
Sheets, skelp, and saw plate.....	28	11	145	232
Tin plate.....	2,646	3,481	18,923	24,642
Structural shapes.....	563	704	2,720	5,320
Rails and rail fastenings.....	267	185	1,569	3,739
Welded pipe.....	298	342	2,563	1,730
Other pipe.....	365	311	8,234	6,527
Barbed wire.....	159	261	2,157	2,496
Round iron and steel wire.....	151	210	1,409	1,042
Flat wire and strip steel.....	213	103	1,395	1,308
Wire rope and strand.....	62	77	684	1,378
Other wire.....	1,739	2,351	14,985	18,374
Hoops and bands.....	367	696	6,095	5,494
Nails, tacks, and staples.....	19	41	213	223
Bolts, nuts, and rivets.....	12	127	1,450	516
Other finished steel.....	8,893	11,906	84,976	100,981
Rolled and finished steel.....	8,893	11,906	84,976	100,981
Cast iron pipe and fittings.....	...	...	40	724
Castings and forgings.....	57	145	1,245	1,107
Total.....	20,202	46,673	261,781	354,283

*Manganese content only.
†Chromium content only.
‡Silicon content only.
§Alloy content only.

OCTOBER exports of iron and steel products declined sharply to 220,209 gross tons, after having reached the record total of 301,330 tons in September. The 27 per cent drop was accounted for largely by scrap, movement of which decreased from 225,212 tons in September to 147,213 tons in October. In October, 1933, total exports were 164,755 tons, while the outward movement of scrap amounted to only 81,187 tons.

Tin plate led the October movement of finished steel products exported, with a total of 14,793 tons. In the previous month, 17,752 tons of tin plate was shipped out of the country, compared with 15,448 tons in October, 1933. Black and galvanized sheets, in the order named, were the next most popular products with our foreign customers, October shipments having amounted to 6142 tons and 5496 tons respectively.

October shipments abroad of ingots, blooms, billets, slabs and sheet bars were 5069 tons, compared with only 430 tons in the preceding month and with 846 tons in October last year. As shown in the accompanying tables, steel bars, barbed wire, structural shapes, skelp and galvanized pipe were also shipped to foreign buyers in considerable quantities.

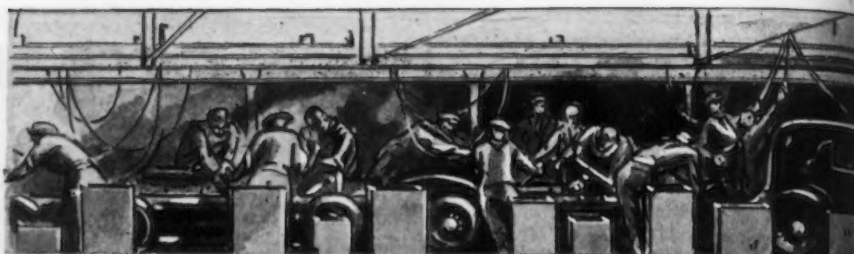
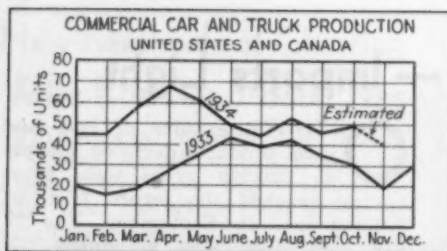
As mentioned in THE IRON AGE last week, October iron and steel imports totaled only 20,202 tons, the second lowest monthly total of the year.

Sources of American Imports of Iron and Manganese Ores
(In Gross Tons)

	October		Manganese Concentrates 35 Per Cent or Over 1934
	Iron Ore		
	1934	1933	
Canada		45	....
Cuba	11,000		....
Chile	66,400	129,912	....
Spain		295	....
Norway .....			....
Sweden .....			....
French Africa .....			....
Prussia	7,900	17,400	6,257
India			895
Brazil			270
West Africa			5,088
Other countries	13,489	3,666	....
Total	98,789	151,318	12,510

United States Imports of Pig Iron by Countries of Origin
(In Gross Tons)

	October		Ten Months Ended October	
	1934	1933	1934	1933
United Kingdom.....	40	255	540	5,395
British India.....	2,527	9,458	30,504	57,653
Germany.....	...	...	...	234
Netherlands.....	503	9,294	59,400	58,014
Canada.....	112	288	7,960	11,132
France.....	...	...	100	...
Belgium.....	...	...	50	...
Norway.....	...	...	2,046	...
Sweden.....	...	225	615	3,205
All others.....	3,500	...	4,558	2,584
Total.....	6,682	19,621	105,773	139,020



THIS WEEK ON THE

Production Continues at Low Rate as Industry Waits for Ford

DETROIT, Dec. 4.

THE automobile industry may have been guilty of many things over a period of years, but never before has it even been accused of bashfulness. One of its outstanding characteristics has been to rush forth and tell the world all about its new models as soon as they are coming off the assembly lines, and sometimes before volume production started. Since dealers have been educated to expect the ballyhoo to begin the minute they are invited in to inspect the new cars, they are not entirely pleased, in some cases, at the prospect of waiting from Dec. 1 until early January for the official public announcements.

This shyness on the part of the 1935 debutantes in the motor car world is understandable, however, to those who are following closely the psychology dominant in Detroit today. Automotive people are talking about 1935 "being a Ford year." The master of Dearborn has the upper hand and everyone believes he will take full advantage of the situation. Huge tales are going the rounds about Ford's promotional expenditures the coming year which, if true, will dwarf those of recent years. The legendary Henry Ford never assumed such large proportions as he does today. Even his competitors shake their heads and admit privately that he is the smartest of them all.

In the face of gigantic preparations at Dearborn for a big year no company intends to be so foolish as to stick out its neck by naming a price on its cars until Mr. Ford indicates what he expects to ask for the new V-eight. Until his views are known on this subject, there will continue to be plenty of palpitation of the heart in Detroit. At the same time neither Chevrolet nor Plymouth is able to outline in full its strategy for the months ahead.

Just what Chevrolet will do remains effectively concealed. The start

of operations on its Master series of passenger cars has been moved farther back so that initial assemblies will not be made until late January or possibly after Feb. 1, according to reliable reports. Meanwhile work will be concentrated on the Standard series and trucks. There is understood to have been a marked increase recently in the ratio of Standard cars to Master cars registered in the United States. Just how aggressively the Standard will be pushed next year depends on what the competitive situation is a month hence. Chevrolet's projected production for December is said to be 40,000 units.

Knee action for the Master Chevrolet will be continued in 1935, despite stories to the contrary. The point is that if price becomes the major factor in the competitive battle of the Big Three next year, Chevrolet is likely to stake its fortunes on its Standard job, which never has had independent springing. What knee action costs Chevrolet is problematical, but one is not far wrong in saying that it means an outlay of \$12 to \$14 more per car than for the conventional front-axle design.

Plymouth appears to be in an uncomfortable spot. It apparently is paring costs wherever possible so as to be in a position to meet a low price on the new Ford. It has dropped knee action because of the extra manufacturing expense involved in independent springing. At least that is the way most Detroiters explain elimination of this feature. Plymouth officials are said to claim that knee action has been less and less a selling point as the year advanced and that customers don't seem to care whether they have it or not. The new Plymouth (and Dodge) will have molybdenum steel leaf springs which, along with redistribution of car weight by locating the motor farther forward and bringing the back seat ahead of the rear axle, is

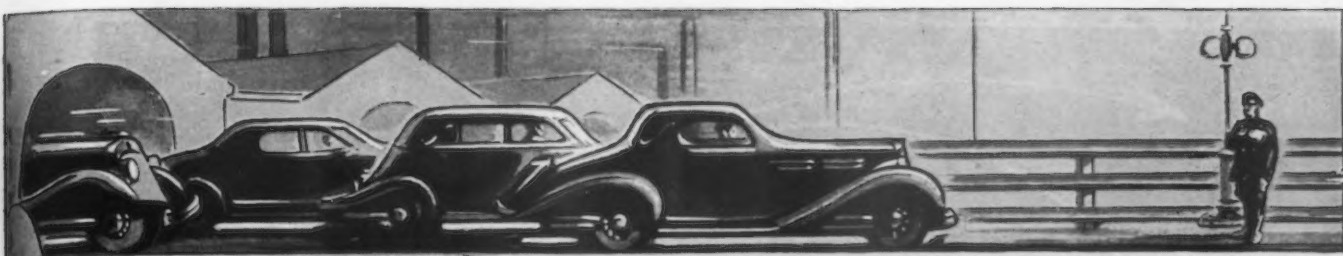
said to give the same comfortable ride heretofore attained by means of independent springing using coil springs.

The reorganization of Chrysler's field sales staff also has been the butt for jibes of the opposition who assert that it is an economy measure. On the other hand, Chrysler officials vigorously deny these reports, labeling them as propaganda originating in the offices of competitors. They emphasize that the realignment, which in some respects resembles the former Buick Olds-Pontiac set-up in General Motors, does not involve any reduction in the factory's field forces. It means instead a smaller territory for each sales representative to cover, giving him an opportunity to intensify his work on behalf of every Plymouth dealer. It is designed to strengthen Plymouth's position in the smaller population centers.

Car Output Still Lagging

Production of finished cars is lagging badly. The rate of output will have to be accelerated considerably if December's total is to be around 125,000, as advance figures indicate it will be. Ford has hardly assembled a car, although it is turning out 1000 to 1500 motors a day for shipment to branch assembly plants. Many Ford parts suppliers are running on multiple shifts to meet releases given them in the last few weeks. Some of the tooling up at Rouge is progressing less rapidly than anticipated; this is said to be especially true of the new body department where the two-door sedans will be built. How many cars Ford will make in December is anyone's guess. Public announcement of the new V-eight is looked for about Dec. 15. Delays are reported to have made an earlier showing impossible.

Plymouth suddenly descended on suppliers the past week with requests for parts to be fabricated and rushed to them as quickly as possible. Similar



ASSEMBLY LINE

requests came from Dodge and from the Chrysler-DeSoto plant on Jefferson Avenue. Cars are now coming off the Plymouth assembly line at its Mount Elliott plant and are being stored in the Lynch Road lot until ready for shipment to dealers. Initial truckaways to dealers at distant points are going forth. The plan seems to be to have cars in dealers' hands in liberal quantities at announcement time so that salesmen can say to customers, "You can get your car tomorrow. You don't have to wait on a delivery date a month from now." Experience has shown that a customer often will choose a car on the basis of being able to get it when he wants it. With this idea in mind, Plymouth intends to make every effort to raise its production to full capacity as soon as possible.

The new car to be offered by Plymouth, by the way, will have only one wheelbase instead of the two prevailing the past year. The new models will be approximately as long as the deluxe Plymouth of 1934. It might be well at this point to say, however, that wheelbases will be less valuable as measuring sticks in the future than they have been in past years. It has been customary to think that the longer a car is the more comfortable are its riding qualities. This isn't so true today. Redistribution of weight and knee action are being relied on to accomplish the same gliding ride which formerly could be secured only by a long wheelbase and increased car weight.

Is Knee Action Here to Stay?

General Motors engineers, in fact, contend that for the reason just stated knee action isn't expensive. A long car is a handicap to maneuver in traffic and to park. The general economic situation as well as competitive conditions prohibit the raising of retail prices. Yet people want more and more riding ease. The way to give it to them without adding much to weight and without augmenting the wheelbase is by means of independent springing. Although knee action admittedly costs more than conventional springing, the extra expense is nowhere near as much as the cost of lengthening the wheelbase and weight of the car. For this reason knee ac-

By **BURNHAM FINNEY**

Detroit Editor, **THE IRON AGE**

tion is here to stay. Instead of being dropped from the front wheels, say these engineers, it is likely to be extended to the rear wheels.

Steel Roofs Vary

The all-steel roof to be adopted by several manufacturers varies somewhat in design with the individual car. It is said that the General Motors units have developed a one-piece roof which sweeps one-third of the way down the back of the car, being welded to the back panel. It likewise extends over to the siderails on both sides of the car. It is understood that the steel roof to be fabricated by an independent maker will consist of two pieces of sheet steel welded together. Someone has borrowed a name from the Navy and called the steel top the "turret top." With its development, states one company, "the old padded chicken wire center with a fabric cover will be a thing of the past."

Next year's cars will not be freakish in appearance or of radical design. Most companies are moving one notch closer to what is generally, and sometimes erroneously, called streamlining. Little money has been spent on mechanical innovations. Certainly there is nothing comparable in importance with the introduction of knee action a year ago.

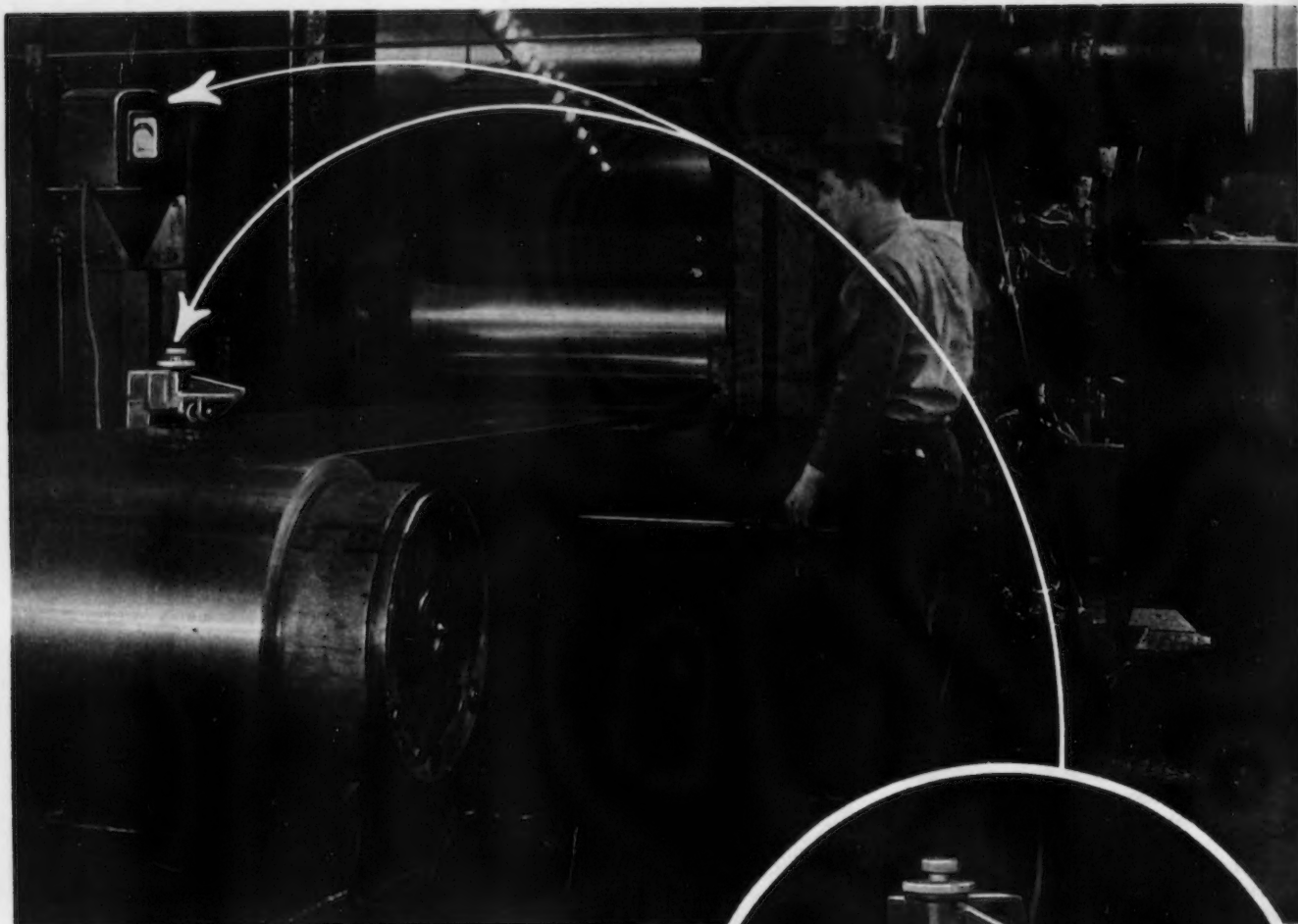
Body treatment will be the outstanding feature, and even in this respect conservatism will rule. There will be long sweeping lines to finish off the rear of the car, and radiators will be longer and more pointed, giving the car more of a "greyhound" look. Still further emphasis will be put on "cleaning up" the front-end appearance. In at least one case cowl lights will be set in the inside of the front fenders, the first time that this has ever been done.

Refinements will be introduced to make driving in all kinds of weather more comfortable than at present. More efficient and quicker acting

brakes, fuel economy, easier starting in cold weather, more space inside the car, larger baggage compartments and slightly wider doors are some of the features. Safe driving at high speeds is the specific aim of one low-price car manufacturer in the design of its 1935 models.

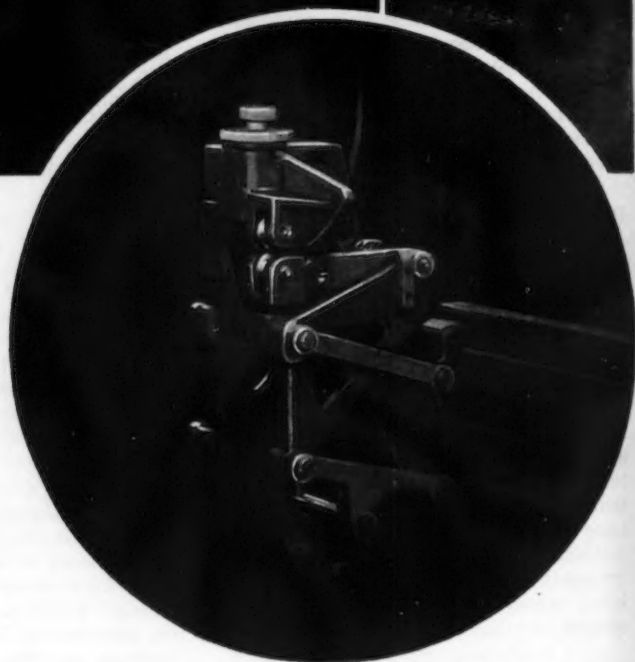
Cars which formerly were spread out over a wide price range are being bunched for the coming year in the less-than-\$1,000 field. Differentials between cars supposedly in two price groups are likely to be less than in the past year. The best example is General Motors, which will have a Standard Chevrolet, Master Chevrolet, Pontiac six, Oldsmobile six, Pontiac eight, Oldsmobile eight and Buick eight selling at less than \$1,000. Manufacturers like Graham and Hupmobile have lower-price cars than ever before in their histories. The rush of the industry toward production of light cars is not hard to explain. This year retail sales of cars selling at \$1,000 or less have constituted 95.7 per cent of the total, compared with 93.6 per cent in 1933. A leading car maker, forecasting developments in 1935 models, gives the reason for this trend: "Engineers and designers of low-priced cars will be seen to have outdone themselves in giving those millions of motorists who have flocked to the low-price standard during the depression more than they ever dreamed of in their higher-priced cars."

In thinking of the coming year's production and sales, Mr. Ford set the pace with the prediction that at least 1,000,000 V-eights will be sold. As this column already has pointed out, this prediction is relatively conservative, since Ford's output in 1934 will be well over 800,000 units. General Motors has been reticent about expressing its views of the prospects ahead. However, the following figures are believed fairly representative of what the various divisions hope to do in 1935: Chevrolet, 1,000,000 units; Pontiac, 125,000; Buick, 85,000; Oldsmobile, 150,000; and Cadillac-LaSalle, 20,000. This makes a total of 1,380,000 units. In the first 10 months of 1934 General Motors sales to dealers in the United States and Canada, plus overseas shipments, amounted to 1,137,816 units.



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sandth variations in strip thickness. He controls his product accordingly. This is done with the mill traveling at high speed, without stopping or slowing down.

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Manufacturers Present Proposed Platform for Recovery

A PROPOSED platform for national recovery has been prepared by the National Association of Manufacturers and was submitted this week to the National Industrial Council, meeting in New York. The program will also be submitted to the Congress of American Industry, which was scheduled to meet on Wednesday and Thursday.

The platform follows:

National Economic Planning and Public Administration

To achieve recovery and hasten progress, cooperation founded on the realities of experience, understanding and good-will must displace conflict arising from misunderstanding and prejudice. Government should be the servant of its free citizens, not their master. Government control over our destinies by national economic planning will not lead to real recovery.

Avoid policies which tend to centralize control over industry, labor and agriculture and to regiment America. No group of men is wise enough to plan and control the operations of all our manifold business activities. History demonstrates that such control impairs or destroys individual initiative and freedom.

Maintain the constitutional balance between legislative, executive and judicial power, avoiding legislation by administrative regulation and unwarranted delegation of authority.

Maintain open, public and well regulated court procedure.

Avoid any threat of bureaucratic tyranny.

Public Finance

Stability in public finance is essential to stability of all credit—public and private. Such stability cannot be achieved, recovery cannot be attained by piling deficit on deficit and pyramiding new debts on old.

Balance the Federal budget by adoption of policies which will stimulate business, restore employment, increase national income and permit cutting public expenses to fit reasonable taxes.

Withdraw all Federal aid from every State which does not reduce expenditures (excluding relief and bond obligations) to at least the 1926 level.

Make progress toward the prompt balancing of the budget by rejecting payment of the soldiers' bonus until due.

Make Federal appropriations for constitutional purposes only.

Issue frequent, clear and complete Federal fiscal statements.

Substitute for existing State sales taxes and present selective Federal sales and "nuisance" taxes an equitable non-cumulative manufacturers' sales tax levied at only one point of manufacture, collected by the Federal Government and equitably shared with the States.

Money, Banking and Private Credit

Savings and investments provide the tools for workers—they provide working capital and the basis of private credit necessary to keep workers and tools busy. To promote recovery, establish confidence in money and in our credit machinery—encourage savings and investment, and do not hamper their legitimate use.

Remove uncertainties as to the present and future status of our money. What is needed is a monetary standard that will serve at once both the internal price level and external exchange. The government should return as soon as practical to a genuine and unrestricted gold standard with a definite content of the standard gold dollar.

Protect our banking system from all possibility of partisan or personal political control over private credit.

A thoroughly competent and non-political commission should study the whole field of banking. One of the fundamental needs is uniformity of banking laws and regulations, together with uniform and efficient banking inspection.

Amend the Securities Act and the Securities Exchange Act to conform to the principles of the British law and practice in these fields, leaving enforcement to judicial process alone. Do not cripple business with a strait-jacket but severely punish the dishonest and unscrupulous.

Integrity of contract is fundamental to public and private credit. The Frazier-Lemke Act frightens lenders from agricultural loans and should be repealed. The principle of such measures impairs confidence in the validity of all agreements.

Government Competition

Government should withdraw from all activities competing with those of its citizens. So long as the threat of such competition prevails, private industry will hesitate, recovery will be delayed.

Stop government competition, which converts the taxpayer's money into an instrument for his destruction.

Establish an accurate and uniform system of government accounting for those operations in which the government does engage so that the citizen and Congress may know exactly the cost of such operations.

Even if it were a proper function of the government to build "yardsticks" with taxpayers' money, there can be no value in any comparison between the costs of public and private operations unless the government "yardstick" shows inches for taxes, interest, overhead, insurance, depreciation and all other charges which all enterprise must bear, and which private business must take into account.

Abandon all forms of government competition which as examples threaten industry, thwart private initiative and retard recovery.

Employment Relations and Industrial Disputes

Industrial strife stimulated by misinterpretation and misrepresentation of the respective rights and privileges of employees and employers, and the threat of arbitrary determination of wages and hours which ignore economic possibilities, prevent recovery. The powers of government should not be used to control local relationships between employees and employers.

The economic foundation of industrial progress is productive efficiency. The attainment of this result requires the harmonious cooperation of labor, management and investors. It demands that employer and employee be free to bargain collectively or individually in such forms as are mutually satisfactory to them without coercion from any source. This precludes the remote control of such local relations by predetermined forms imposed by National

Labor Boards, whose efforts now invite and incite conflicts between labor and management.

In conformity with these principles—

Protect men in their right to work.

Prohibit sympathetic or general strikes or lockouts, blacklists and boycotts.

Refrain from policies which attempt to force men into labor organizations.

Encourage local settlements of disputes.

Make every organization of employers and employees equally subject to public authority, legally answerable for its own conduct or that of its agents, and equally subject to judicial remedy.

Do not deprive individuals and minorities of their right to bargain for themselves.

Keep politics out of labor relations.

Management recognizes that the productivity of the worker should be fairly and even liberally reflected in his compensation. Labor, however, cannot share what is not produced. Arbitrary determination of hours and wages, as proposed in such measures as thirty-hour bills, ignores this fundamental principle.

Social Security

Distress caused by unemployment must be relieved, but relief must not be such that it will ultimately destroy the resources essential both for temporary relief and for re-employment. Obtain security by measures which reduce rather than perpetuate or actually increase unemployment.

Society must relieve actual distress. The objective of relief is to restore self support.

Relief must not entice workers from, or discourage their return to, private employment. It must not be permitted to undermine the morale of those who receive it. Relieve distress, not subsidize it.

Relief must not bankrupt the government; for that will end all relief and impose misery on all.

Administer relief through qualified local agencies who are better able to prevent abuses.

Social measures, such as compulsory unemployment insurance or reserves, must be founded on principles which will not create further unemployment or make re-employment hazardous; or threaten industry with confiscatory taxes and burdens and thereby delay recovery; or increase relief and living costs; or aggravate the disparity between prices of agricultural and manufactured products; or cause office seekers to make a political football of such measures; or impair confidence in public finance.

Lewis Company Takes Japanese Mill Order

PITTSBURGH, Dec. 4.—An order for a 68-in. three-high rolling mill with tables, motor and controls for a Japanese steel company has been received by the Lewis Foundry & Machine Co., Coraopolis, Pa., a subsidiary of the Blaw-Knox Co. The mill will be used for rolling sheet steel, having a capacity of 70 tons of 16-gage sheets per 8-hr. shift, and will be driven by a 500-hp. electric motor. Delivery will be made in 10 to 12 weeks.

Betz-Pierce Co., Cleveland, has been made distributor for Macwhyte Co., maker of wire rope, and will carry complete stock in a wide range of sizes, grades and constructions, including preformed and internally lubricated wire rope.

November Pig Iron

Output Up

4 Per Cent

PRODUCTION of coke pig iron in November totaled 956,940 gross tons, compared with 951,062 tons in October. The daily rate in November, at 31,898 tons, increased almost 4 per cent over the October rate of 30,679 tons a day.

There were 60 furnaces in blast on Dec. 1, making iron at the rate of 29,895 tons a day, compared with 65 furnaces on Nov. 1, operating at the rate of 31,310 tons a day. Seven furnaces were blown out or banked during November and two furnaces were put in operation. The Steel Corporation blew in one, and took two off blast, independent steel companies put one in and took three off blast, and merchant producers blew out or banked two furnaces.

Among the furnaces blown out or banked are the following: One Lackawanna and one Cambria, Bethlehem Steel Co.; the Troy furnace, Troy Furnace Corp.; one Edgar Thomson, Carnegie Steel Co.; one Monongahela, National Tube Co.; the Neville Island furnace, Davison Coal & Coke Co., and one Hasleton, Republic Steel Corp.

The Portsmouth furnace of the Wheeling Steel Corp. and a Fairfield unit of the Tennessee Coal, Iron & Railroad Co. were blown in.

Daily Average Production of Coke Pig Iron

	Gross Tons			
	1934	1933	1932	1921
January	39,201	18,348	31,380	55,299
February	45,131	19,798	33,251	60,950
March	52,243	17,484	31,201	65,556
April	57,561	20,787	28,430	67,317
May	65,900	28,621	25,276	64,325
June	64,338	42,166	20,935	54,621
½ year	54,134	24,536	28,412	61,356
July	39,510	57,821	18,461	47,201
August	34,012	59,142	17,115	41,308
September	29,935	50,742	19,753	38,964
October	30,679	43,754	20,800	37,848
November	31,898	36,174	21,042	36,782
December .....	.....	38,131	17,615	31,625
Year .....	.....	36,199	23,733	50,069

Production of Coke Pig Iron and Ferromanganese

	Gross Tons		Ferromanganese†	
	Pig Iron*		1934	1933
January	1,215,226	568,785	11,703	8,810
February	1,263,673	554,330	10,818	8,591
March	1,619,534	542,011	17,605	4,783
April	1,726,851	623,618	15,418	5,857
May	2,042,896	887,252	10,001	5,948
June	1,930,133	1,265,007	10,097	13,074
½ year	9,798,313	4,441,003	75,642	47,063
July	1,224,826	1,792,452	10,188	18,661
August	1,054,382	1,833,394	8,733	16,953
September	898,043	1,522,257	7,100	13,339
October	951,062	1,356,361	9,830	16,948
November	956,940	1,085,239	8,134	14,524
December .....	.....	1,182,079	.....	9,369
Year .....	.....	13,212,785	.....	136,852

*These totals do not include charcoal pig iron. The 1932 production of this iron was 15,055 gross tons.
†Included in pig iron figures.

Merchant Iron Made, Daily Rate

	Tons			
	1934	1933	1932	1921
January	7,800	2,602	6,256	7,251
February	7,071	2,863	7,157	5,287
March	7,197	2,412	4,658	6,090
April	8,338	1,908	3,329	3,070
May	9,099	3,129	3,213	4,286
June	9,499	4,088	4,435	3,674
July	7,880	6,783	.....	.....
August	6,043	7,756	.....	.....
September	5,986	10,034	.....	.....
October	5,765	8,634	.....	.....
November	6,610	7,639	.....	.....
December .....	.....	8,358	.....	.....

Production by Districts and Coke Furnaces in Blast

Furnaces	Production (Gross Tons)		December 1		November 1	
	November (30 Days)	October (31 Days)	Number in Blast	Operating Rate, Tons a Day	Number in Blast	Operating Rate, Tons a Day
New York:						
Buffalo	65,748	59,617	3	1,770	4	2,050
Other New York and Mass..	20,530	18,216	1	175	2	590
Pennsylvania:						
Lehigh Valley	26,668	26,884	3	890	3	865
Schuylkill Valley .....	.....	.....	0	.....	0	.....
Susquehanna and Lebanon Valleys	18,672	10,860	1	620	1	350
Ferromanganese .....	.....	.....	0	.....	0	.....
Pittsburgh District	166,505	177,588	10	4,460	13	6,285
Ferro. and Spiegel	4,424	4,020	1	145	1	130
Shenango Valley	16,266	16,678	1	540	1	540
Western Pennsylvania	18,839	16,197	1	630	1	520
Ferro. and Spiegel	3,710	5,810	0	.....	1	185
Maryland	38,715	52,046	2	1,290	2	1,680
Wheeling District	59,363	69,549	4	2,480	4	2,015
Ohio:						
Mahoning Valley	78,375	72,591	3	1,635	4	2,505
Central and Northern	104,641	87,172	7	3,490	7	3,270
Southern	21,369	18,161	3	1,045	2	585
Illinois and Indiana	177,489	179,154	9	5,915	9	5,485
Mich. and Minn.	46,117	45,925	3	1,535	3	1,480
Colo., Mo. and Utah	18,885	19,002	2	630	2	615
The South:						
Virginia .....	.....	.....	0	.....	0	.....
Kentucky	12,407	12,929	1	415	1	415
Alabama	58,217	58,663	5	2,230	4	1,745
Ferromanganese .....	.....	.....	0	.....	0	.....
Tennessee .....	.....	.....	0	.....	0	.....
Total	956,940	951,062	60	29,895	65	31,310

Scrap Higher at Detroit

DETROIT, Dec. 4.—Increasing steel operations, the scarcity of scrap and the active demand for old material in other districts are factors which have boosted prices on open-hearth grades of scrap 50c. to \$1 a ton. Because they can be shipped outside the Detroit area with relative ease, hydraulic bundles have risen \$1 and are selling at 50c. a ton more than heavy melting steel. Sheet clippings and low phosphorus plate scrap are up \$1 and flashings 75c. Blast furnace and foundry grades are less active and prices of these items have fluctuated little in the last week. Dealers are anticipating the continuation of a strong market, with prospects that prices will go still higher in the next few weeks. The final boatloads of scrap prior to the close of navigation will leave Detroit for Cleveland and Buffalo this week.

Creeping Recovery Movement Makes Further Headway in Steel Industry

Ingot Output Registers Seventh Consecutive Weekly Increase—Scrap In Further Advance—November Pig Iron Output Up 4 Per Cent

TRENDS in the iron and steel industry are still somewhat mixed, but demand in the aggregate has registered another small net gain, lifting ingot output from 29 to 29½ per cent of capacity. The operating rate has now had a slow but uninterrupted rise for seven consecutive weeks, and trade opinion, though still exceedingly conservative, is beginning to lean to the view that a creeping recovery movement may be getting under way.

Most responsive to this change in attitude is the scrap market, which has become buoyant on virtually all fronts. Scrap prices, as measured by THE IRON AGE index, have risen from \$10.33 to \$10.92 a ton on the strength of advances of 25c. a ton at Chicago, 50c. at Philadelphia and \$1 at Pittsburgh. The scrap composite is now \$1.42 a ton above the low of the year, reached in late September and early October.

PIG IRON production in November was in step with the slow expansion of steel output, showing a gain of 4 per cent. Total production was 956,940 tons, as compared with 951,062 tons in October, while the daily average was 31,898 tons as against 30,679 tons in the previous month. The November gain in daily rate compares with an October increase of 2½ per cent over September, the low month of the year. Though output rose in November, the number of active blast furnaces declined from 65 to 60.

Pig iron shipments in November showed increases of 15 to 20 per cent at Detroit and 25 per cent at Cleveland, partly, no doubt, because of heavier consumption by automotive foundries. Manufacturers of heating equipment, sanitary ware and farm implements have also taken more iron. Indicative of still larger melt in the near future is a current inquiry from a leading automobile maker for 75,000 tons of malleable castings.

THOUGH automobile foundries and parts makers generally have been steadily speeding up their operations, motor car builders themselves have been exceedingly slow in getting started on new model production. Until recently steel orders from the automotive trade have come mainly from parts manufacturers, the purchases of the car builders being limited to small quantities of material for trial tests on new dies. This week, however, sees Chrysler's new model program under way in earnest, with the pressure on suppliers proportionately increased.

Aside from the automotive industry, which should expand its steel orders steadily from now on, buyers are showing the caution characteristic of the period preceding year-end inventories. And with the reestablishment of virtually all existing market quotations for the first quarter, there is no price incentive for

replenishing stocks, now well deflated. At the same time the absence of large stocks in buyers' hands indicates that recent gains in mill output, mainly without the support of the automobile industry, have reflected a genuine increase in ultimate consumption.

RAIL buying is no nearer than it has been, although a few roads which have been preparing their budgets have indicated their probable needs. The Santa Fe's requirements are estimated at 27,000 tons of 112-lb. rails and 3500 tons of 90-lb. sections, besides 14,000 tons of track accessories. The minimum requirements of the Van Sweringen roads are placed at 80,000 tons, of which 40,000 tons will be for the Chesapeake & Ohio, 30,000 tons for the Erie and 10,000 tons for the Nickel Plate. The National Railways of Mexico has bought 400 freight cars in this country in addition to the 1200 ordered from an American equipment builder a fortnight ago.

Tin mill operations continue to hold at 45 per cent of capacity on the strength of large orders for stock plate and a steady flow of export shipments.

Pressure on public works projects has relaxed since the election and structural awards and inquiries are light. Lettings, at 3850 tons, are the smallest of the year, while new projects call for 11,890 tons. Structural steel awards for the month of November totaled 64,025 tons, compared with 54,230 tons in October and 41,780 tons in September. Sheet steel piling contracts for the week total 26,160 tons, of which 26,000 tons is for the Grand Coulee dam at Almira, Wash. New steel piling projects require 3900 tons.

The Navy has allotted 4420 tons of plates and 1939 tons of shapes for vessels to be built in its own yards. The War Department has taken bids on \$2,300,000 worth of machine tools for arsenals and field service stations and thus far has distributed orders aggregating \$470,856 among 47 manufacturers.

STEEL production has risen one point to 19 per cent at Pittsburgh, one-half point to 34 per cent at Chicago, two points to 34 per cent in the Valleys and two points to 41 per cent in the Cleveland-Lorain district. The Detroit rate is off four points to 48 per cent.

THE IRON AGE composite prices for pig iron and finished steel are unchanged at \$17.90 a ton and 2.124c. a lb. respectively. Wire rods are now quoted in two classifications, common and combination rods. Bale ties and poultry fence are priced on a length instead of a net ton basis. Less-than-carload extras are being applied on merchant wire items for first quarter shipment. The minimum base size of forging quality billets has been established at 4 x 4 in., with all smaller sizes classed as bars.

▲ ▲ ▲ A Comparison of Prices ▲ ▲ ▲

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron	Dec. 4, 1934	Nov. 27, 1934	Nov. 7, 1934	Dec. 5, 1933	Finished Steel	Dec. 4, 1934	Nov. 27, 1934	Nov. 7, 1934	Dec. 5, 1933
Per Gross Ton:					Per Lb.:	Cents	Cents	Cents	Cents
No. 2 fdy., Philadelphia....	\$20.26	\$20.26	\$20.26	\$19.26	Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.40	2.40	2.40	2.25
No. 2, Valley furnace.....	18.50	18.50	18.50	17.50	Hot-rolled annealed sheets, No. 24, Gary.....	2.50	2.50	2.50	2.35
No. 2 Southern, Cin'tl.....	19.13	19.13	19.13	18.13	Sheets, galv., No. 24, P'gh..	3.10	3.10	3.10	2.85
No. 2, Birmingham†.....	14.50	14.50	14.50	13.50	Sheets, galv., No. 24, Gary..	3.20	3.20	3.20	2.95
No. 2 foundry, Chicago*....	18.50	18.50	18.50	17.50	Hot-rolled sheets, No. 10, P'gh	1.85	1.85	1.85	1.75
Basic, del'd eastern Pa.....	19.76	19.76	19.76	18.76	Hot-rolled sheets No. 10, Gary	1.95	1.95	1.95	1.85
Basic, Valley furnace.....	18.00	18.00	18.00	17.00	Wire nails, Pittsburgh.....	2.60	2.60	2.60	2.35
Valley Bessemer, del'd P'gh.	20.76	20.76	20.76	19.76	Wire nails, Chicago dist. mill	2.65	2.65	2.65	2.40
Malleable, Chicago*	18.50	18.50	18.50	17.50	Plain wire, Pittsburgh.....	2.30	2.30	2.30	2.20
Malleable, Valley	18.50	18.50	18.50	17.50	Plain wire, Chicago, dist. mill	2.35	2.35	2.35	2.25
L. S. charcoal, Chicago.....	24.04	24.04	24.04	23.54	Barbed wire, galv., P'gh.....	3.00	3.00	3.00	2.85
Ferromanganese, seab'd car- lots	85.00	85.00	85.00	82.00	Barbed wire, galv., Chicago dist. mill	3.05	3.05	3.05	2.90
					Tin plate, 100 lb. box, P'gh..	\$5.25	\$5.25	\$5.25	\$5.25

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.
*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	\$36.37 1/2	\$36.37 1/2	\$36.37 1/2	\$36.37 1/2
Light rails, Pittsburgh	35.00	35.00	35.00	32.00
Rerolling billets, Pittsburgh	27.00	27.00	27.00	26.00
Sheet bars, Pittsburgh	28.00	28.00	28.00	26.00
Slabs, Pittsburgh	27.00	27.00	27.00	26.00
Forging billets, Pittsburgh	32.00	32.00	32.00	31.00
Wire rods, Pittsburgh	38.00	38.00	38.00	36.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.70	1.70	1.70	1.60

Finished Steel

Per Lb.:				
Bars, Pittsburgh	1.80	1.80	1.80	1.75
Bars, Chicago	1.85	1.85	1.85	1.80
Bars, Cleveland	1.85	1.85	1.85	1.80
Bars, New York	2.13	2.13	2.13	2.08
Plates, Pittsburgh	1.80	1.80	1.80	1.70
Plates, Chicago	1.85	1.85	1.85	1.75
Plates, New York	2.08	2.08	2.08	1.98
Structural shapes, Pittsburgh	1.80	1.80	1.80	1.70
Structural shapes, Chicago	1.85	1.85	1.85	1.75
Structural shapes, New York	2.05 1/4	2.05 1/4	2.05 1/4	1.95 1/4
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	2.10
Hot-rolled strips, Pittsburgh	1.85	1.85	1.85	1.75
Cold-rolled strips, Pittsburgh	2.60	2.60	2.60	2.40

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables. ‡Blue Eagle copper.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh.	\$12.25	\$11.25	\$10.50	\$11.50
Heavy melting steel, Phila.	10.75	10.25	9.63	10.00
Heavy melting steel, Chicago	9.75	9.50	9.00	8.50
Carwheels, Chicago	10.00	10.00	10.00	9.00
Carwheels, Philadelphia	10.75	10.75	10.50	10.75
No. 1 cast, Pittsburgh	11.75	11.50	11.25	11.25
No. 1 cast, Philadelphia	11.00	11.00	10.75	11.25
No. 1 cast, Ch'go (net ton)	8.50	8.50	8.00	8.50
No. 1 RR. wrot., Phila.	11.25	11.25	11.25	11.00
No. 1 RR. wrot., Ch'go (net)	8.75	8.75	8.00	7.25

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	\$3.85	\$3.85	\$3.85	\$3.75
Foundry coke, prompt	4.60	4.60	4.60	4.25

Metals

Per Lb. to Large Buyers:				
Electrolytic copper, refinery‡	8.75	8.75	8.75	7.75
Lake copper, New York‡	9.12 1/2	9.12 1/2	9.12 1/2	8.00
Tin (Straits), New York	50.87 1/2	51.30	51.25	53.75
Zinc, East St. Louis	3.70	3.67 1/2	3.75	4.50
Zinc, New York	4.05	4.02 1/2	4.10	4.85
Lead, St. Louis	3.35	3.35	3.50	4.05
Lead, New York	3.50	3.50	3.65	4.15
Antimony (Asiatic), N. Y.	13.75	13.00	10.50	7.25

▲ ▲ ▲ The Iron Age Composite Prices ▲ ▲ ▲

Finished Steel

Dec. 4, 1934	2.124c. a Lb.
One week ago	2.124c.
One month ago	2.124c.
One year ago	2.008

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.

	HIGH	LOW
1934	2.199c., April 24	2.008c., Jan. 2
1933	2.015c., Oct. 3	1.867c., April 18
1932	1.977c., Oct. 4	1.926c., Feb. 2
1931	2.037c., Jan. 13	1.945c., Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29
1928	2.286c., Dec. 11	2.217c., July 17
1927	2.402c., Jan. 4	2.212c., Nov. 1

Pig Iron

\$17.90 a Gross Ton
17.90
17.90
16.90

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	HIGH	LOW
1934	\$17.90, May 1	\$16.90, Jan. 27
1933	16.90, Dec. 5	13.56, Jan. 3
1932	14.81, Jan. 5	13.56, Dec. 6
1931	15.90, Jan. 6	14.79, Dec. 15
1930	18.21, Jan. 7	15.90, Dec. 16
1929	18.71, May 14	18.21, Dec. 17
1928	18.59, Nov. 27	17.04, July 24
1927	19.71, Jan. 4	17.54, Nov. 1

Steel Scrap

\$10.92 a Gross Ton
10.33
9.71
10.00

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	HIGH	LOW
1934	\$13.00, Mar. 13	\$9.50, Sept. 25
1933	12.25, Aug. 8	6.75, Jan. 2
1932	8.50, Jan. 12	6.42, July 5
1931	11.33, Jan. 6	8.50, Dec. 29
1930	15.00, Feb. 18	11.25, Dec. 9
1929	17.58, Jan. 29	14.08, Dec. 3
1928	16.50, Dec. 31	13.08, July 2
1927	15.25, Jan. 11	13.08, Nov. 22

Output Up in Pittsburgh And Valley Districts



But Gain in Steel Bookings Is Very Slow—Quarterly Contracting Not Yet Under Way—Scrap Advances \$1 a Ton

PITTSBURGH, Dec. 4.—The aggregate volume of steel orders received in this district in the past week failed to reflect an appreciable gain. Long awaited automotive buying on a large scale has not yet appeared, but steel producers here continue to rely heavily upon this prospect for a much needed sustaining force to operations as the year-end approaches. Activity in some finishing mills will probably be maintained partly in order to permit generous holiday payrolls, but unless automotive buying appears before the new year a slump in the latter part of December is considered likely.

First quarter contracting has not gotten under way. Practically all buying activity is restricted to a spot basis and there is certainly no incentive for consumers to lay in stocks before the inventory period. Demand for heavy hot-rolled products, and particularly for structural steel, is rather listless. Tube mills are enjoying a contraseasonal demand for oil country goods and standard pipe. In practically all cases finishing mills are maintaining recent schedules.

Increased open-hearth activity in some small independent mills has boosted the Pittsburgh ingot production this week one point to 19 per cent of capacity. Production in the Wheeling district is unchanged at 55 per cent. Output in the Valleys and nearby northern Ohio mills is up two points to 34 per cent.

No. 1 heavy melting steel at Pittsburgh has advanced \$1 a ton to \$12 to \$12.50.

Pig Iron

Consumers have not thus far hastened to commit themselves for first quarter requirements. In fact, spot orders for December shipment are less frequent. The barrier to major covering by non-integrated mills is the present low rate of activity in this district and, in addition, the uncertain outlook for any notable improvement next quarter. The foundry trade continues to melt on a restricted basis, although slightly heavier shipments of foundry coke indicate an improvement.

Semi-Finished Steel

The minimum base size of forging quality billets is now established at

4 x 4 in., with all smaller sizes to apply to bars. The change was effective Dec. 1 on all material for shipment during first quarter. Although there is some improvement in demand for wire rods, skelp and billets from some non-integrated mills, aggregate movement reflects no notable pickup. Semi-finished material stocked during the summer is still being liquidated, and there is no reason to expect any major activity in this market during the current month. Few first quarter contracts have been signed.

Rails and Track Accessory

Activity is extremely dull, with no general improvement in sight for the remainder of December. The outlook now hinges on the theoretical rail and accessory requirements of various roads for the coming year. Specific inquiries for such forward needs, however, have been entirely absent.

Bolts, Nuts and Rivets

No change in the present base discounts of 70, 10, 10 and 10 per cent off list on bolts and nuts is expected when first quarter prices are announced probably late this week. In some districts, however, there seems to be chronic softness in prices, but large producers continue to maintain present base schedules. Lack of business precludes a definite test of prices.

Bars

This market appears to be on the brink of definite improvement. Expected large-lot buying by the motor car makers may put in a belated appearance some time in December, while interest from the agricultural implement manufacturers is already expanding. Miscellaneous requirements in the past week were unchanged. First quarter covering has apparently not gotten under way.

Reinforcing Steel Bars

A fair amount of tonnage is being placed for highway construction next spring. Private work is showing encouraging trends, although major tonnage in this category is scarce. Rail steel will be used for distillery building at Lawrenceburg, Ind., the award having been made to a Cincinnati producer. Although there is some talk of stringing a series of bridges to connect the lower Florida

Keys, the use of reinforcing steel for such work is considered uneconomical.

Cold Finished Steel Bars

Further gradual improvement is reported in this market. No large orders have originated at automotive centers, and a more notable increase in bookings is in prospect when heavy motor car assembly has begun. General specifications are also better. Jobbers are not yet active, and will probably not replenish stocks with any freedom until after the year end. Practically all current business is for shipment promptly or by Dec. 31.

Plates and Shapes

Fresh inquiries and awards in the past week were unusually light. A large potential tonnage of plates pends for barge construction, but progress toward definite commitments is slow. The structural steel market is manifesting more than seasonal dullness, with awards and inquiries reported here last week the lightest in several months. Small-lot structural steel business is likewise pursuing seasonal trends. Bids are expected to be requested in January on stiffening trusses and viaduct and approach sections for the Tri-Borough bridge at New York. Progress on present contracts for that project is well behind schedule.

Tubular Products

Demand for oil country goods and standard pipe is unusually favorable for this time of the year. The flow of orders from those sources is at least sufficient to forestall an expected seasonal decline. Some tube mills report a 5 to 10 per cent gain in November bookings over those for October. Indications are that the November gains will be held at least for the first half of December. Increased drilling in the east Texas and Gulf regions is figuring in the present movement of oil country goods. Demand for other classes of tubular goods shows little trend. Mechanical tubing is expected to benefit noticeably as soon as the automotive industry gets into large production.

Wire Products

Effective Dec. 1 for shipment during first quarter, less carload extras will apply to merchant wire items. Some releases from leading motor car producers have stimulated the movement of mechanical and spring wire, but general demand from automotive centers cannot yet be considered significant. Miscellaneous requirements are increasing slightly, while jobbers are piecing out stocks. The jobbing trade, however, is not expected to be important in the period preceding inventory taking. Wire mill operations are slightly higher at 25 per cent.

Sheets

Demand in the past week was slightly less vigorous than that in

the preceding period. Specifications from motor car and parts manufacturers failed to increase, while miscellaneous tonnage faltered slightly. Sheet operations in the current week may fall a shade below the recent average of 40 per cent of capacity. Any sharp boost in output for December depends largely upon the buying plans of the automotive industry, which has not yet released significant tonnage for new model construction. Optimistic plans in the refrigeration field for next year augur well for sheet business after the turn of the year. Air conditioning is increasingly a factor in sheet consumption and promises to be a good outlet for next year.

Tin Plate

Increased specifications against current contracts and anticipatory releases against next year's contracts for rolling in the current month are sustaining operations at at least 45 per cent of capacity. A leading producer this week is scheduled slightly higher. Some independent mills are considerably below the general average but expect freer releases soon. Export business continues to be an important outlet.

Strip Steel

Improvement in this market in the past week was rather general. No large automotive tonnage reached strip producers in this district in that period. As a result of the general pickup in orders, one or two mills report backlogs to be heavier than at any time since last June. Optimistic plans of agricultural implement manufacturers for next year have brightened the outlook for strip demand in first quarter. Output this week is well maintained at 30 to 35 per cent. First quarter contracting has been virtually absent.

Coke and Coal

Clement weather has adversely affected demand for domestic coke, and track accumulations of that fuel have risen. Shipments of foundry coke are somewhat heavier, but furnace coke remains lifeless. The bituminous coal market is unchanged and entirely featureless. Prices for all major grades of fuels are holding.

Scrap

Steel-making grades have reached definitely higher ground in the past seven-day period. Although in the immediate Pittsburgh district consumer demand is far from active, continued bidding for scrap for delivery in the Wheeling district has absorbed a large part of such scrap as is readily available for prompt delivery. The effect of this strong bidding has been to boost No. 1 heavy melting steel \$1 a ton to \$12 to \$12.50. Moreover, a round lot of No. 1 heavy melting steel and scrap rails has been sold in the Pittsburgh district at the higher price. That range is further

justified by recent sales of railroad scrap. No. 1 steel on the latest Baltimore & Ohio list was sold at \$13.05, delivered Martins Ferry, W. Va. Dealers in the Pittsburgh district are experiencing difficulty in covering steel scrap orders committed at lower prices, and in cases where orders are theoretically covered by yard stocks, brokers are more inclined to cover outstanding orders in the open market at a loss rather than ship from stocks representing values several dollars a ton above the current market. Heavy breakable cast has advanced \$1 a ton to \$11 to \$11.50, while No. 1 cast is 25c. a ton higher at \$11.50 to \$12.

Construction More Active on Coast

SAN FRANCISCO, Dec. 3.—Increased activity on the Coast comes at a period when seasonal reaction generally sets in. The San Francisco Bay region, in particular, is going ahead with more new work this month than at any time during the last quarter. Bids will be opened Dec. 20 for the Trans-Bay bridge viaduct and approaches, in which 3300 tons of bars are specified under two contracts. The United States Coast Guard bulkhead at Government Island, Cal., will require 3000 tons of sheet steel piling and several hundred tons of reinforcing bars. Latest tonnage estimates on the Alameda County court house, to be constructed at Oakland, Cal., show that approximately 2400 tons of structural steel and 1000 tons of reinforcing bars will be used. Two schools at San Francisco will require 400 tons of reinforcing bars, while the two dams near San Jose, Cal., on which the date for bids has been advanced to Dec. 14, will call for 508 tons of bars.

Activity in southern California has continued to hold the gains made during the fall months. Consolidated Steel Corp. booked 600 tons of structural steel for schools at Long Beach and Santa Ana. Awards of 100 and 200 tons of structural steel for schools went to Minneapolis-Moline Power Implement Co. and Virginia Bridge & Iron Works respectively. The Metropolitan Water District is taking bids for 1785 tons of rail and billet reinforcing steel and 165 tons of structural steel under two specifications. Plans for the El Capitan-Lakeside pipe line at San Diego, Cal., call for 2800 tons of plates.

In the Northwest the Consolidated Steel Corp. is reported as low bidder on the Malheur River and Dead Ox siphons, which are to be a part of the Owyhee project in Oregon. Approximately 4100 tons of plates will be required on the siphons and line. The Alaska Road Commission has taken bids on a bridge which calls for 350 tons of structural steel.

Contrary to expectations, the cast

iron pipe market has shown increased activity. This has been due primarily to the calls for bids by cities in Utah and Nevada. Nine contracts will require 2871 tons. The greater number of new projects at this particular time is generally attributed to the Government's desire to stimulate construction employment during the agricultural off-season.

Pig Iron Shipments Gain at Buffalo

BUFFALO, Dec. 4.—Pig iron shipments for the month of November were 15 per cent better than shipments for the month of October. Makers are hoping that the coming automobile building program will mean a buying movement, but they are frank in stating that they do not see other grounds for immediate optimism. Prices for first quarter, effective Dec. 1, show no change from last quarter prices. Present buying is confined almost entirely to carload lots for spot delivery.

Steel mill operations are practically unchanged, though reports are current that the next two weeks will see a considerable step-up in open-hearth activities here.

The scrap market is the strongest it has been in months. The strength of the Pittsburgh and Youngstown markets, and the diversion of scrap from customary sources of supply for this district, are combining to make all prices firm. Reports are current of a sale of heavy melting steel in a small lot at \$11. The principal consumer continues to offer \$10 without getting any substantial tonnage. Scattered sales of stove plate at \$9.25 are reported.

Pipe Lines

Iowa City Light & Power Co., Iowa City, Iowa, will make extensions in steel pipe lines for connection with city gas mains for natural gas supply, authorized by City Council. Cost about \$50,000.

United States Engineer Office, Missouri River District, Kansas City, Mo., has rejected bids recently received for 5500 ft. of 3 and 4-in. steel pipe for Fort Peck, Mont., project. Early call for new bids is planned.

Loyminster, Sask., is planning welded steel pipe line from natural gas fields north of city for municipal gas supply. Cost about \$90,000.

Department of Public Works, Houston, Tex. J. M. Nagle, commissioner, plans new call for bids for steel pipe and appurtenant materials for extensions and improvements in gas system in Magnolia Park district. Fund of \$92,000 has been arranged through Federal aid. (Contract for labor has been let to Brown & Root, Inc., 4300 Calhoun Road, Houston, at \$41,115.)

Kanah, Utah, closed bids Dec. 6 for steel pipe for water lines, with alternate bids on cast iron. Fund of \$40,000 has been secured through Federal aid. J. R. Sutherland, Richfield, Utah, is consulting engineer.

Shawnee, Okla., is in the market for 1800 tons of 20 and 27-in. steel pipe for PWA water project.

More Tonnage in Sight In Chicago District



**Railroad Demand Is Pointing Upward—
Ford Inquires for 75,000 Tons of Mal-
leable Castings—Inland Books 26,000
Tons of Piling**

CHICAGO, Dec. 4.—More encouraging news is trickling in from a greater number of sources and as a consequence the outlook for iron and steel business is much improved. The Santa Fe will buy over 40,000 tons of rails and track supplies, as well as a Diesel switching locomotive and three Diesel cars. Four hundred additional cars have been placed by Mexican railways and a steel pipe line project has appeared in Oklahoma. Ford is reported to be in the market for 75,000 tons of malleable castings and Inland Steel Co. will roll 26,000 tons of steel piling for the Grand Coulee dam. Bids are being taken today on the Muscatine, Iowa, dam and bids on the Winona, Minn., unit will be announced before the end of the month.

Scrap prices have moved up 25c. a ton and the market remains strong, with most factors pointing to still higher levels, if not in December, then soon after the turn of the year.

Early mails received at the opening of the contracting period showed users of rolled steel products to be in no rush as to first quarter commitments. However, in the case of pig iron, contracting has gotten away to a start that exceeds the opening week of the fourth quarter. Except in sheets there is no major change in the flow of specifications from a week ago. However, heavier automobile needs in finished steel are very near at hand. Ingot output is up not more than one-half point to 34 per cent of capacity.

Pig Iron

Forward contracting is under way, and while not yet in heavy volume it marks real improvement over the opening week of the fourth quarter contracting period. Rush shipments are more numerous, especially to malleable shops that are feeling the impulse of automobile demand. It is reported here that Ford is in the market for 75,000 tons of malleable castings. The Nash foundry, which has been down for some time, is expected to resume operations in the very near future.

Cast Iron Pipe

Word is being passed around that Washington is putting pressure on many municipalities that have projects in the planning stage but that

have been unduly slow in reaching the point of placing contracts. Small awards have been made at Mendota, Wis., and Valparaiso, Ind. Hammond, Ind., is taking bids this week. The status of the Milwaukee filter plant is again in doubt and there is a possibility that new bids will be taken. Sellers are keeping a close watch on industry with the hope that private buying will make its appearance in the spring.

Reinforcing Bars

The market has been slow this week, but this is accounted for more by the holiday than by any major change in the situation as a whole. Hammond, Ind., is taking bids on 1000 tons for a filter plant. Bids on the 4000-ton Milwaukee project exceeded the Government estimate and there is some talk of the job being readvertised and new tenders taken in four sections. Weighing in the scales against this procedure is the desire of the Government to get this project under way. Small lots of Illinois paving bars are being let, but the bulk of the tonnage will be delayed until spring. Sellers are of the opinion that the Fort Peck project bars, not being needed for many months, will not be purchased for some time to come.

Sheets

Releases of automobile sheets are coming in faster and mills in this district expect a further sharp improvement in the next ten days. Agricultural implement manufacturers also are taking more sheets. Miscellaneous users are not materially increasing their specifications. Order mails at the opening of the contract period are not impressive.

Plates

It is now reported that the National Railways of Mexico have placed 400 cars in addition to the 1200 announced a week ago. Material for these cars has not yet been placed, pending decision as to the shops in which construction will be undertaken. A pipe line project at Shawnee, Okla., calls for 1800 tons of 20 and 27-in. steel pipe. This is a water project that is being undertaken with PWA aid. Orders for tanks are light and only a lone inquiry for 200 tons has come to light in recent days. However, plate mills will get some

relief from tonnages that will go into Mississippi River dams, two of which are active at this time.

Rails

The Santa Fe budget calls for the expenditure of \$1,600,000 for rails and track supplies. This railroad proposes to buy 27,000 tons of 112-lb. rails and 3500 tons of 90-lb. rails. It now has on hand, without accessories, about 10,700 tons carried forward from last year. It is expected that accessory orders will total close to 14,000 tons to cover needs both for old and for new rails. The Van Sweringen lines are planning a program that may reach a total of 100,000 tons of rails. Nothing definite has been heard from other railroads.

Bars

The inventory period is an obstacle to expansion at this time in the miscellaneous use of bars. Based on inquiries, there is adequate room for the belief that potential demand is piling up. Use by automobile plants, though steady, is not up to expectations of mills, but here again wants are accumulating, and it seems to be only a matter of one week or another when the flow of orders will expand. Farm implement manufacturers are holding steadfastly to all gains.

Wire Products

Shipments are gradually reaching higher levels, and spot orders are growing in like proportion. Mails so far contain little that is interesting in the way of first quarter contracts, but inquiries are at hand which lend encouragement to sellers. The merchant trade remains dull, and the feeling between jobbers and mail order houses is very tense.

Structural Material

Awards, at 3000 tons, are not heavy, but they are interesting because of several private lettings, one of which is for a power house for a public utility, the first job of its kind that has appeared in the Middle West in several years. Fresh inquiries stand at 8000 tons and are of the usual run of highway bridges and other projects for which Government money is being spent. Bids went in today on the Muscatine, Iowa, dam, and Dec. 20 has been set as the time for taking bids on the Winona, Minn., dam.

Scrap

Heavy melting steel has moved up again and has now reached a top of \$10 a gross ton, delivered consumers' yards. On the whole, the market is strong, and the few disturbing factors that can now be found are of insufficient weight to disturb the main structure. Purchases of heavy melting steel by mills in November totaled more than 50,000 tons. Railroad offerings are heavy, at about 20,000 tons. The Santa Fe alone is offering 3000 tons of heavy melting, 1000 tons of No. 1 wrought and 4000 tons of other miscellaneous grades.

Steel Bookings Fail To Gain in New York



Demand Remains on a Short-Range Basis Except in the Case of Stock Tin Plate—Little Rail Buying Looked For

NEW YORK, Dec. 4.—Steel bookings, after falling off following the Thanksgiving holiday, have again recovered to the level of recent weeks. The upward trend in demand noticeable of late in other sections of the country has been less evident here. Buyers are showing almost no interest in their first quarter requirements and their current purchases are measured largely by their actual needs. Among exceptions are jobbers who have been buying stock tin plate in anticipation of the abandonment of separate prices on that commodity Jan. 1. While orders have been heavy, their size has been limited by the requirement that all shipments be made by the mills by Dec. 31. A published report that a New York jobber had bought 1500 cars of stock plate is a gross exaggeration. Less than one-tenth that quantity was ordered.

Projects calling for round tonnages of plates and sheet steel piling are more numerous. A local riveted pipe water line, calling for 450 tons of plates, has been placed with Alco Products, Inc. Carnegie Steel Co. has been awarded 160 tons of piling and 30 tons of structural steel for the Point Judith Federal project near New London, Conn. The New York Dock Co. has taken bids on pier No. 38, Brooklyn, requiring 900 tons of sheet steel piling. A fair tonnage of steel piling will be needed for coffer dams at Randall's Island in connection with pier construction for the Triborough bridge, New York.

The Lehigh Valley has deferred the purchase of 250 hopper cars pending alterations in the design of the equipment.

Little rail buying is looked for in this district unless the Government persuades the railroads to take loans for such purchases.

Pig Iron

Most foundries have not departed from their cautious policy of purchasing against immediate needs despite the availability of first quarter commitments. Consequently iron sales for the past seven-day period have not been as large as furnace representatives had expected. Aggregate bookings amounted to 2800 tons, as compared with 1950 tons in the preceding

period and 750 tons sold two weeks earlier. A number of furnace representatives are of the opinion that foundry business is slightly better, although it is still of a miscellaneous character and spotty. There is little doubt but what considerable first quarter business should be placed under contract before the end of the year inasmuch as sellers are pressing toward that end and buyers will be more inclined to act accordingly now that delivery after the inventory period is assured. The Troy furnace has now been blown out. Its yard stocks are fairly low, and it is expected that a good portion will be shipped before winter interferes with transportation.

Reinforcing Steel

A fair flow of small tonnages and occasional highway awards from nearby States are keeping distributors

here moderately busy. Concrete Steel Co. will furnish 380 tons for several jobs in the Boston area, Igoe Brothers were awarded 250 tons for jail buildings at Bordentown, N. J., and a Hempstead, N. Y., school building calling for 120 tons of bars, was awarded to Carroll-McCreary Co., Inc. American Steel & Wire Co. will furnish 200 tons of mesh for a highway in Delaware county, N. Y. Pending business includes four good-sized projects to be let in Trenton, N. J., Dec. 17, which involve over 1100 tons of bars and mesh. A letting in Albany today covers general contracts containing 500 tons of reinforcing material.

Scrap

Brokers here are busily covering against old export contracts. New foreign business is not at present receiving much encouragement as brokers are seemingly faced with a rising market and are not at all sure what price conditions will prevail six weeks from now when delivery becomes necessary. Steel is firm at the \$8.50 and \$7 price levels for No. 1 and No. 2 respectively for truck deliveries on barge. At these levels the flow of scrap is not particularly plentiful as small dealers are looking for additional advances. However there is no broker sentiment favoring such action for the immediate future. Stove plate has latterly shown strength on steady purchases for English delivery. Brokers are paying \$6.25 for desirable lots without protest.

Rise in Steel Output Impends in South

BIRMINGHAM, Dec. 4.—Pig iron books have been opened for the first quarter, with the current price of \$14.50 reaffirmed, but there is little interest in the market. Current bookings remain mostly on a spot basis. The outlook for December does not appear any better, on account of holiday and end-of-the-year curtailments in prospect. There is some hope expressed that the turn of the year will bring improved business.

Woodward Iron Co. banked its single active stack last week, for an indefinite period. The Tennessee Coal, Iron & Railroad Co. continues to operate two furnaces at Fairfield, one of which was placed in operation for recharging and rebanking, but which has been delayed. The active total is four, with Sloss-Sheffield and Republic furnishing the other two.

A small tonnage of rails has been booked from two railroads, the amount, it is said, being around 6000 tons. A small amount of track accessories has also been placed. The Ensley rail mill will likely start operat-

ing again on Dec. 10 for a week or ten days.

Demand for sheets and wire products is about as it has been for some weeks past. This business is expected to taper off somewhat as the month passes because of the annual inventory period.

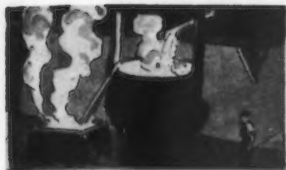
It is expected that before the end of the month some of the railroads will begin placing their requirements for the first half of 1935.

The Tennessee company is operating five open-hearths at Fairfield. The Gulf States open-hearth plant is still down, but production will likely start again around Dec. 7.

Pressure pipe lettings last week were all small, from 100 to 200 tons. The outlook for December at this time is just as good as it was for November at the beginning of the month. A number of lettings are already scheduled and others are pending.

The scrap market has very few signs of life. Steel mills are buying practically nothing, foundries are buying a little No. 1 cast, while some grades are entirely inactive. One broker reports that 8000 tons of scrap was shipped out of Mobile last week for export.

Cleveland-Lorain Rate Up Two Points to 41 Per Cent



**Trends Are Mixed But Demand for Hot-Rolled Strip Steel Takes Sharp Upturn—
Scrap Up 50c a Ton**

CLEVELAND, Dec. 4. — While trends in the demand for finished steel are somewhat mixed, the aggregate volume of business appears to be gaining slightly. The bright spot in the automotive situation during the week was a sharp upturn in the demand for hot-rolled strip steel. This was largely due to the starting of production on new models by the Chrysler Co. and the purchase of steel by stamping plants making Chrysler parts, although some good business came from parts makers that supply other automobile companies. Stamping plants in this territory were instructed to move forward deliveries as soon as possible on Chrysler parts scheduled for late December shipment.

Some strip business was placed for January shipment. While strip steel took a spurt, demand for sheets from automotive sources declined the past week. This falling off is expected to be only temporary, as those automobile companies that plan to get under production early in January will have to place orders for finished sheets without much further delay to assure deliveries early next month.

Manufacturers of building material continue to order sheets quite freely for fabrication during the winter for their spring trade. Demand for tin mill black plate has become fairly active.

Ingot output in the Cleveland-Lorain territory increased two points to 41 per cent of capacity this week. While two open-hearth furnaces were put on in Lorain, one was taken off by a Cleveland plant, evidently because of the lull in the automotive demand for sheets. Miscellaneous orders for steel are fairly numerous, but are still confined to small lots. Railroads in this territory have made up their 1935 budgets, but will not send out their rail inquiries until after the first of the year. The Van Sweringen roads are expected to purchase at least 80,000 tons, estimates of minimum requirements being 40,000 tons for the Chesapeake & Ohio, 30,000 for the Erie and 10,000 for the Nickel Plate.

Steel-making scrap has advanced 50c. a ton and the market is very firm.

Pig Iron

Sales declined somewhat the past week, which is attributed to the holiday. Shipments during November were 25 per cent greater than in October. The recent good demand from manufacturers of heating equipment and sanitary ware is being well maintained. While business from automobile foundries has increased, the gain is not so much as had been expected by this time. While orders are fairly numerous, most of them are small, being for one to three car lots. There is no forward buying, as with present prices re-established for the first quarter there is no incentive for consumers to place contracts.

Sheets

New business fell off during the week, which was probably partly due to the holiday. Orders continue to come from the automotive industry in the Michigan territory, but none is for sizable lots. Refrigerator manufacturers are ordering steel rather freely for new models on which they are getting under production. Demand from stove makers has subsided.

Strip Steel

New demand is brisker than for some time. One sales office entered more tonnage than during any week since May. Some fresh business in sizable lots, mostly in hot-rolled strip, came from motor car parts manufacturing plants affiliated with automobile companies, and quite a little business came from jobbing stamping plants doing automotive work. Considerable of the gain is due to the speeding up of production by the Chrysler Co., which has instructed its parts makers in this territory to ship as soon as possible parts scheduled for late December delivery. Cold rolling plants not making hot-rolled strip are getting busier and have increased their orders for hot-rolled material. Some strip orders for January shipment have come from automotive sources. A good tonnage of hot-rolled strip is involved in a contract just placed with the Midland Steel Products Co. by the Reo Motor Car Co. for its entire automobile frame requirements for the balance of this year and all of 1935.

Bolts, Nuts and Rivets

Bolt and nut sales and shipments in November were practically the same as in October. Makers expect to name first quarter prices this week. In spite of the recent reduction to 70, 10, 10 and 10 per cent off list, the market is weak, concessions from this discount being made, particularly to jobbers. Rivet manufacturers probably will re-establish present prices for both large and small rivets for the first quarter.

Bars, Plates, and Shapes

The recent gain in the demand for merchant bars is being maintained, and orders for alloy steel bars and billets have improved. Demand is largely from forge shops doing automotive work. Orders are confined to small lots. Structural activity continues to lag. A factory building has been placed in Toledo, taking 386 tons. The Ohio State highway department has issued a new list of bridge projects calling for 125 tons of structural steel and 100 tons of reinforcing bars. Demand for plates continues dull.

Scrap

New demand for steel-making scrap for shipment to the Youngstown district has caused an advance of 50c. per ton on steel-making grades. The market is very firm, and blast furnace scrap has advanced 25c. a ton. Up to \$9.50 a ton is being paid by dealers for No. 1 heavy melting steel for shipment to Youngstown. The higher prices are not bringing out much scrap, as holders are not inclined to sell.

Scrap Still Strong At Boston

BOSTON, Dec. 4.—In the scrap market, steel turnings, long bundled skeleton and forge flashings are 50c. a ton higher. Some material for Pennsylvania delivery has been moved at the new prices, mostly distress scrap, but those having storage lots are still holding for higher prices. Little, if any, heavy melting steel, No. 2 steel or similar scrap is moving out of New England via rail, and exporters are still active bidders for material, paying around \$8 a ton delivered local army base for No. 1 steel and around \$6.75 for No. 2 steel. Slightly more activity in textile and machinery cast has really established prices for those grades, based on sales, for the first time in months. Chemical concerns continue to buy cast iron borings sparingly, but shipments are going to New Jersey regularly.

Current buying of pig iron is virtually at a standstill. A boat this week unloaded a few hundred tons of Indian iron here, most of which was sold before it arrived. Little, if any, prospective business is in sight.

Operations in Philadelphia District Hold at 24 Per Cent



Plate Mills and Galvanizers Here Share in Latest Navy Awards — Scrap Continues Upward Despite Absence of Heavy Mill Buying

PHILADELPHIA, Dec. 4.—A light demand for miscellaneous steels is all that is keeping mill operations at the present level, as none of the encouraging factors apparent in Western districts seems to apply here. However, despite the continued absence of railroad and private ship-building buying, the trade continues to look to the future with considerable confidence. What will develop to support this confidence is still somewhat uncertain, although high hopes are being held for a sizable seasonal bulge in bookings after the turn of the year. It is almost certain that if current sentiment is not backed up with some substantial ordering in the near future, trade feeling will probably again fall to a low level.

The smaller mills in this area are currently hard pushed to obtain rolling orders to take care of their open-hearth output. Aggregate operations of the largest interest continue to average slightly over 25 per cent, and district output is consequently unchanged at 24 per cent of capacity. At Pencoyd a small structural mill is running on single turns and the three open-hearths will be down for most of the week.

Jobbers are purchasing steel and wrought iron pipe in somewhat heavier quantities, and wire nails are also slightly more active. It is expected that this business will taper rapidly and not reappear until after the inventory period. First quarter prices on bolts and nuts are expected to be announced soon. At present these products are being offered here with few takers at 70 and four tens off list by Western makers. About the lowest profitable price is judged to be around 70 and one ten. If efforts to stiffen the market succeed, users will probably hasten to cover as far forward as possible.

Pig Iron

Despite the availability of first quarter iron, mills and foundries are showing little interest in new commitments. As most consumers are not pushed for supplies, sellers look for no great bulge in commitments unless advancing freight rates or some price development drives in for-

ward tonnages. Foundries supplied by sellers here are believed to be somewhat more active, and the steady demand for deliveries on old contracts apparently supports this view. However, general business must necessarily pick up considerably before melting schedules reach even a partially satisfactory level.

Bars, Plates and Shapes

There is only a negligible demand for bars, but plates and shapes are more encouraging on the basis of Navy awards and several pending bridge projects. The Reading Railroad is expected to place about 800 tons of plates this week for car repairs in its own shops. The Navy is taking bids on additional requirements and is slowly allotting tonnages on work which had previously been bid. Several tenders for schedule 3400, closed Nov. 2, were eliminated on minor technicalities, but final awards of 4420 tons of plates and 1650 tons of shapes have been drawn from a hat. In this district the Penn Galvanizing Co. and Joseph P. Cattie & Brothers secured around 1300 tons of galvanized plates and shapes; Lukens Steel Co. received 220 tons; Alan Wood, 468 tons; and Central Iron & Steel Co. was awarded 1030 tons. Part of the light rolled products covered in Navy schedules 3404 and 3658 were also placed in this district. Pending highway projects include three bridges in Pennsylvania calling for 340 tons, to be bid Dec. 14, and a New Jersey highway bridge, requiring 240 tons, which closes next Monday. A building at Glasgow, Va., requiring 400 tons will be closed Dec. 6. McClintic-Marshall Corp. will furnish 225 tons of shapes for a high school at Penns Grove, N. J., and Schoemaker Bridge Co. has been awarded 100 tons for a substation of the Philadelphia-Camden bridge approach.

Sheets

Sellers here are in a slightly better position on the strength of sustained miscellaneous demand, together with purchases of 2000 tons or so weekly by autobody builders. It is expected that body and accessory work will ex-

pand quite markedly here when automobile makers swing fully into the production of new models. At present the Budd plant is turning out the equivalent of 3500 units for Ford, Studebaker, and Chrysler each week, and the Heintz plant is proportionately just as busy with accessories and fender production for Willys-Overland. The Budd concern is also engaged on the construction of three new stainless steel trains. Stove makers have practically deserted the steel market and are busy preparing for inventory taking. Demands of any size are not expected to come from this industry until early February.

Imports

The following iron and steel imports were received here last week: 377 tons of pig iron from British India, 169 tons of iron ore from the Netherlands, 22 tons of steel bars from France, 19 tons of steel tubes from Sweden and 1 ton of tungsten scrap from England.

Scrap

Some of the dealer hysteria of the Pittsburgh area has extended into this district and has naturally been reflected in a general hardening of prices on important grades. A nearby mill has ordered a round tonnage of steel, but other consumers are steadfastly avoiding the current market. This attitude is seemingly justified in view of the improbability that mill operations in this territory will soon advance far beyond the present 24 per cent. However the expected relapse in scrap quotations is far from a certainty, what with an unprecedented withdrawal of distress material for export. A good tonnage of No. 1 steel was sold to a district mill last week at \$11, thereby establishing that grade 50c. higher, and a smaller lot of No. 2 steel was delivered at \$9.50 a ton. A few random lots of machine shop turnings have been purchased at \$5.75, and Phoenixville recently accepted a few cars of stove plate at \$8.50. Pencoyd has purchased a little cast iron direct from dealers but has shown no desire to take steel. Bethlehem likewise is making moderate dealer purchases, but other mills here are only taking occasional carlots of steel and cast grades at various price levels. Export loadings are unchanged in volume, with brokers openly paying \$9.75 and \$8.75 for No. 1 and No. 2 steels respectively. One boat at Port Richmond is ready to leave with 8000 tons of steel for Japan, and another is loading 5000 tons of miscellaneous grades for England. Steel is now being loaded at Baltimore for Japan, and a boat of steel has just cleared Norfolk for Italy.

Prices of Finished Steel and Iron Products

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
F.o.b. Duluth	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Buffalo	1.95c.
F.o.b. Philadelphia	2.00c.
F.o.b. New York	2.10c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.

Rail Steel

(For merchant trade)

F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Gary	1.75c.
F.o.b. Moline, Ill.	1.75c.
F.o.b. Cleveland	1.75c.
F.o.b. Buffalo	1.80c.
F.o.b. Birmingham	1.90c.
F.o.b. cars dock Gulf ports	2.10c.
F.o.b. cars dock Pacific ports	2.25c.

Billet Steel Reinforcing

(Straight lengths as quoted by distributors)	
F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago	2.10c.
F.o.b. Gary	2.10c.
F.o.b. Detroit	2.20c.
F.o.b. Cleveland	2.10c.
F.o.b. Youngstown	2.10c.
F.o.b. Buffalo	2.10c.
F.o.b. Birmingham	2.10c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.45c.

Rail Steel Reinforcing

(Straight lengths as quoted by distributors)	
F.o.b. Chicago	1.90c.
F.o.b. Gary	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Youngstown	1.95c.
F.o.b. Buffalo	1.95c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.30c.

Iron

F.o.b. Chicago	1.80c.
F.o.b. Terre Haute, Ind.	1.75c.
F.o.b. Louisville, Ky.	2.10c.
F.o.b. Danville, Pa.	1.80c.
F.o.b. Berwick, Pa.	1.80c.

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	2.10
F.o.b. Chicago	2.15
F.o.b. Gary	2.15
F.o.b. Cleveland	2.15
F.o.b. Buffalo	2.20
F.o.b. Detroit	2.30
Del'd eastern Michigan	2.35

* In quantities of 10,000 to 19,000 lb.

Fence and Sign Posts

Angle Line Posts

	Base per Net Ton
F.o.b. Pittsburgh	\$50.00
F.o.b. Chicago	50.00
F.o.b. Duluth	51.00
F.o.b. Cleveland	50.00
F.o.b. Birmingham	53.00
F.o.b. Houston, Orange, Beaumont, Galveston	59.00
F.o.b. Mobile	58.00
F.o.b. New Orleans, Lake Charles, Corpus Christi	59.00
F.o.b. cars dock Pacific ports	63.00

Plates

	Base per L
F.o.b. Pittsburgh	1.80
F.o.b. Chicago	1.85
F.o.b. Gary	1.85
Del'd Cleveland	1.95
F.o.b. Coatesville	1.90
F.o.b. Sparrows Point	1.90
Del'd Philadelphia	1.95
F.o.b. New York	2.05
F.o.b. Birmingham	1.95
F.o.b. cars dock Gulf ports	2.20
F.o.b. cars dock Pacific ports	2.35
Wrought iron plates, f.o.b. P'gh.	3.00

Floor Plates

F.o.b. Pittsburgh	3.35c.
F.o.b. Chicago	3.40c.
F.o.b. Coatesville	3.45c.
F.o.b. cars dock Gulf ports	3.75c.
F.o.b. cars dock Pacific ports	3.90c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	1.80
F.o.b. Chicago	1.85
Del'd Cleveland	1.98
F.o.b. Buffalo	1.90
F.o.b. Bethlehem	1.90
Del'd Philadelphia	2.00
F.o.b. New York	2.05
F.o.b. Birmingham (standard)	1.95
F.o.b. cars dock Gulf ports	2.20
F.o.b. cars dock Pacific ports	2.35

Steel Sheet Piling

	<i>Base per Lb.</i>
F.o.b. Pittsburgh	2.15c.
F.o.b. Chicago	2.25c.
F.o.b. Buffalo	2.25c.
F.o.b. cars dock Gulf ports	2.60c.
F.o.b. cars dock Pacific ports	2.60c.

SHEETS, STRIP, TIN PLATE

TERNE PLATE

Sheets

Hot Rolled	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.85c.
No. 10, f.o.b. Gary	1.95c.
No. 10, del'd Detroit	2.05c.
No. 10, del'd Phila.	2.14c.
No. 10, f.o.b. Birmingham	2.00c.
No. 10, f.o.b. dock cars Pacific ports	2.40c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.40c.
No. 24, f.o.b. Gary	2.50c.
No. 24, del'd Detroit	2.60c.
No. 24, del'd Phila.	2.69c.
No. 24, f.o.b. Birmingham	2.55c.
No. 24, f.o.b. dock cars Pacific ports	3.05c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.50c.
No. 10 gage, f.o.b. Gary	2.60c.
No. 10 gage, del'd Detroit	2.70c.
No. 10 gage, del'd Phila.	2.79c.
No. 10 gage, f.o.b. Birmingham	2.65c.
No. 10 gage, f.o.b. dock cars Pacific ports	3.10c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.95c.
No. 20 gage, f.o.b. Gary	3.05c.
No. 20 gage, del'd Detroit	3.15c.
No. 20 gage, del'd Phila.	3.24c.
No. 20 gage, f.o.b. Birmingham	3.10c.
No. 20 gage, f.o.b. dock cars Pacific ports	3.50c.

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	3.10c.
No. 24, f.o.b. Gary	3.20c.
No. 24, del'd Phila.	3.39c.
No. 24, f.o.b. Birmingham	3.25c.
No. 24, f.o.b. dock cars Pacific ports	3.70c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Ternes

No. 24, unassorted 8-lb. coating	3.40c.
F.o.b. cars dock Pacific ports	4.10c.

Vitreous Enamel Stock

No. 20, f.o.b. Pittsburgh	3.10c.
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Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.75c.
No. 28, Gary	2.85c.
No. 28, cars dock, Pacific Coast ports	3.35c.

Tin Plate Per Base Box

Standard cokes, f.o.b. P'gh district mill	\$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 20 x 28 in.)	
8-lb. coating I.C.	\$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	15.25
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under 1/4 in.

	Base per L
All widths up to 24 in., P'gh.....	1.85
All widths up to 24 in., Chicago.....	1.95
All widths up to 24 in., del'd De- troit	2.05
All widths up to 24 in., Birmingham	2.00
Cooperage stock, Pittsburgh	2.10
Cooperage stock, Chicago	2.20

Cold-Rolled Strips

Cold-Rolled Strips		Base per L
F.o.b.	Pittsburgh	2.60
F.o.b.	Cleveland	2.60
Del'd	Chicago	2.88
F.o.b.	Worcester	2.80

Fender Stock

No. 14, Pittsburgh or Cleveland	2.90c.
No. 14, Worcester	3.30c.
No. 20, Pittsburgh or Cleveland	3.30c.
No. 20, Worcester	3.70c.

Hot-Rolled Rail Steel Strips

	Base per lb.
F.o.b. Pittsburgh	1.70
F.o.b. Chicago	1.75
F.o.b. Birmingham	1.85

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade Per Lb.

Bright wire	2.30c.
Spring wire	2.90c.
Chicago prices on products sold to the manufacturing trade are \$1 a ton above Pittsburgh or Cleveland, Worcester and Duluth prices are \$2 a ton above, Birmingham \$3 above, and Pacific Coast prices \$9 a ton above Pittsburgh or Cleveland.	

To Jobbing Trade

Qualified jobbers are entitled to a reduction of 20c. a 100 lb. from the base price on carload shipments to stock, and of 10c. a 100 lb. on less-carload shipments to stock.

Base per Keg

Standard wire nails	\$2.60
Smooth coated nails	2.60
Galvanized nails:	
15 gage and coarser	4.60
16 gage and finer	5.10

Base per 100 Lb.

Annealed fence wire	\$2.45
Galvanized fence wire	2.80
Polished staples	3.30
Galvanized staples	3.55
Barbed wire, galvanized	3.60
Woven wire fence, base column	63.00

Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is \$2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are \$2 a ton over Pittsburgh (except for woven wire fence at Duluth which is \$3 over Pittsburgh), and Birmingham mill prices are \$3 a ton over Pittsburgh.

On wire nails, barbed wire, staples and fence wire, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are \$6 a ton over Pittsburgh, while Pacific Coast prices are \$8 over Pittsburgh. Exception: on fence wire Pacific Coast prices are \$11 a ton above Pittsburgh. On staples and barbed wire, prices of \$6 a ton above Pittsburgh are also quoted at Beaumont and Orange, Tex.

Wire Hoops, Twisted or Welded

F.o.b. Pittsburgh	35 and 2 1/2 off
F.o.b. Chicago	35 off

STEEL AND WROUGHT PIPE

AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh

District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Inches	Steel Black Galv.	Wrought Iron Black Galv.
1/4	51 1/2	29 1/2
1/2	53 1/2	35
3/4	58 1/2	47
1	62	52
1 1/4	64	55
1 1/2	64 1/2	55
2	66	57
2 1/2	68	59
3	70	61
3 1/2	72	63
4	74	65
4 1/2	76	67
5	78	69
5 1/2	80	71
6	82	73
6 1/2	84	75
7	86	77
7 1/2	88	79
8	90	81
8 1/2	92	83
9	94	85
9 1/2	96	87
10	98	89
10 1/2	100	91
11	102	93
11 1/2	104	95
12	106	97

Lap Weld

2	58	50	2	37	22 1/2
2 1/2	60	52	2 1/2	38	25
3	62	54	3	40	28 1/2
3 1/2	64	56	3 1/2	42	31 1/2
4	66	58	4	44	34 1/2
4 1/2	68	60	4 1/2	46	37 1/2
5	70	62	5	48	40 1/2
5 1/2	72	64	5 1/2	50	43 1/2
6	74	66	6	52	46 1/2
6 1/2	76	68	6 1/2	54	49 1/2
7	78	70	7	56	52 1/2
7 1/2	80	72	7 1/2	58	55 1/2
8	82	74	8	60	58 1/2
8 1/2	84	76	8 1/2	62	61 1/2
9	86	78	9	64	64 1/2
9 1/2	88	80	9 1/2	66	67 1/2
10	90	82	10	68	70 1/2
10 1/2	92	84	10 1/2	70	73 1/2
11	94	86	11	72	76 1/2
11 1/2	96	88	11 1/2	74	79 1/2
12	98	90	12	76	82 1/2

Butt Weld, extra strong, plain ends

1/4	48 1/2	33 1/2	1/4	41 1/2	45 1/2
1/2	51 1/2	38 1/2	1/2	44 1/2	50 1/2
3/4	56 1/2	43 1/2	3/4	49 1/2	55 1/2
1	61	47 1/2	1	54 1/2	60 1/2
1 1/4	63	51 1/2	1 1/4	56 1/2	64 1/2

Lap Weld, extra strong, plain ends

2	58	50	2	40	26
2 1/2	60	52	2 1/2	42	28
3	62	54	3	44	30
3 1/2	64	56	3 1/2	46	32
4	66	58	4	48	34
4 1/2	68	60	4 1/2	50	36
5	70	62	5	52	38
5 1/2	72	64	5 1/2	54	40
6	74	66	6	56	42
6 1/2	76	68	6 1/2	58	44
7	78	70	7	60	46
7 1/2	80	72	7 1/2	62	48
8	82	74	8	64	50
8 1/2	84	76	8 1/2	66	52
9	86	78	9	68	54
9 1/2	88	80	9 1/2	70	56
10	90	82	10	72	58
10 1/2	92	84	10 1/2	74	60
11	94	86	11	76	62
11 1/2	96	88	11 1/2	78	64
12	98	90	12	80	66

On standard steel pipe an extra 5% off is allowed on sales to consumers while two 5% off apply on sales to jobbers. On less-than-carload shipments prices are determined by adding 20 and 25% and the carload freight rate to the base card. On structural steel pipe the base card is reduced 2 points and two 5% off are allowed to consumers and three 5% off to jobbers.

Note—Chicago district mills have a base

two points less than the above discounts Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain,

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine bolts	Per Cent Off List
70, 10, 10 and 10	75
Carriage bolts	70, 10, 10 and 10
Lag bolts	70, 10, 10 and 10
Plow bolts, Nos. 1, 2, 3 and 7	70, 10, 10 and 10
heads	70, 10, 10 and 10
Hot-pressed nuts, blank or tapped	70, 10, 10 and 10
squares	70, 10, 10 and 10
Hot-pressed nuts, blank or tapped	70, 10, 10 and 10
hexagons	70, 10, 10 and 10
C.p.c. and t. square or hex. nuts, blank or tapped	70, 10, 10 and 10
Semi-finished hexagon nuts, U.S.S.	70, 10, 10 and 10
all sizes	70, 10, 10 and 10
Semi-finished hexagon nuts, S.A.E.	70, 10, 10 and 10
1/4 in. to 7/16 in. diameter	70, 10, 10 and 10
1/4 in. to 1 in. diameter	70, 10, 10 and 10
larger than 1 in. diameter	70, 10, 10 and 10

Store bolts in packages, Pittsburgh	75
Store bolts in packages, Chicago	75
Store bolts in packages, Cleveland	75
Store bolts in bulk, P'gh.	83
Store bolts in bulk, Chicago	83
Store bolts in bulk, Cleveland	83
Fire bolts	60 and 10

Large Rivets	Per 100 Lb.
F.o.b. Pittsburgh or Cleveland	\$2.90
F.o.b. Chicago	3.00
F.o.b. Birmingham	3.05

Small Rivets
(7/16-in. and smaller)

F.o.b. Pittsburgh	Per Cent Off List
70 and 10	75
F.o.b. Cleveland	70 and 10
F.o.b. Chicago and Birm'g'm.	70 and 10

Cap and Set Screws
(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

Per Cent Off List	
Milled cap screws, 1 in. dia. and smaller	85
Milled standard set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread 1/4 in. and smaller	75 and 10
Unset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	85 and 10
Unset set screws, cut and oval point	80
Milled studs	65 and 10

Alloy and Stainless Steel

Alloy Steel Ingots
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped)

Alloy Steel Blooms, Billets and Slabs
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Base price, \$49 a gross ton)

Alloy Steel Bars
(F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton)

Open-hearth grade, base.....2.45c.
Delivered price at Detroit is.....2.60c.
S.A.E. Alloy

Differential Series

Numbers	Differential per 100 lb.
2000 (1/4% Nickel)	\$0.25
2100 (3/4% Nickel)	1.50
2200 (3/4% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
4100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.70
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars is 1/4c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2 1/2 in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars
(F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 2.95c. base per lb.)

STAINLESS STEEL No. 302
(17 to 19% Cr., 7 to 9% Ni, 0.08 to 0.12% C)

(Base Prices, f.o.b. Pittsburgh)

	Per Lb.
Forging billets	19.55c.
Rerolling slabs	15c.
Bars	23c.
Plates	26c.
Structural shapes	23c.
Sheets	33c.
Hot-rolled strip	20 1/2 c.
Cold-rolled strip	27c.
Drawn wire	23c.

Raw and Semi-Finished Steel

Carbon Steel Rerolling Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Uncropped.....\$29 per gross ton

Carbon Steel Forging Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Uncropped.....\$31 per gross ton

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Rerolling.....\$27.00

Forging quality.....\$2.00

Delivered Detroit

Rerolling.....\$30.00

Forging.....\$35.00

Billets Only F.o.b. Duluth

Rerolling.....\$34.00

Forging.....\$34.00

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Open-hearth or Bessemer.....\$28.00

Skelp
F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved	1.70c.
Universal	1.70c.
Sheared	1.70c.

Tube Rounds

Tube Rounds		Base per Lb.
F.o.b. Pittsburgh	.....	1.80c.
F.o.b. Chicago	.....	1.85c.
F.o.b. Cleveland	.....	1.85c.
F.o.b. Buffalo	.....	1.90c.
F.o.b. Birmingham	.....	1.95c.

Wire Rods
(Common, base)

(Common, base)		Per Gross Ton
F.o.b. Pittsburgh	.....	\$38.00
F.o.b. Cleveland	.....	38.00
F.o.b. Chicago	.....	39.00
F.o.b. Anderson, Ind.	.....	39.00
F.o.b. Youngstown	.....	39.00
F.o.b. Worcester, Mass.	.....	40.00
F.o.b. Birmingham	.....	41.00
F.o.b. San Francisco	.....	47 00
F.o.b. Galveston	.....	44.00

Pig Iron and Ferroalloys

PIG IRON

PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	\$19.50	\$20.00	\$19.00	\$20.50
Bethlehem, Pa.	19.50	20.00	19.00	20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Steelton, Pa.	19.50	20.00	19.00	20.50
Sparrows Point, Md.	19.50	20.00	19.00	20.50
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Youngstown	18.50	18.50	18.00	19.00
Buffalo	18.50	19.00	17.50	19.50
Erie, Pa.	18.50	19.00	18.00	19.00
Toledo, Ohio	18.50	18.50	18.00	19.00
Jackson, Ohio	20.25	20.25	19.75	20.25
Detroit	18.50	18.50	18.00	19.00
Hamilton, Ohio	18.50	18.50	18.00	19.00
Chicago	18.50	18.50	18.00	19.00
Granite City, Ill.	18.50	18.50	18.00	19.00
Duluth, Minn.	18.00	19.00	18.50	19.00
Birmingham	14.50	14.50	14.00	15.00
Provo, Utah	17.50	17.50	17.00	17.00

DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Roston Switching District	\$20.00	\$20.50	\$19.50	\$21.00
From Everett, Mass.	21.77	22.27	21.27	22.77
From East Pa. or Buffalo	20.89	21.39	20.39	21.89
Newark or Jersey City, N. J.	20.26	20.76	19.76	21.26
From East Pa. or Buffalo	19.51	19.51	19.01	20.01
Philadelphia	19.76	19.76	19.26	20.26
From Eastern Pa.	20.50	20.50	19.50	20.50
Cincinnati	20.26	20.26	19.26	20.26
From Hamilton, Ohio	20.77	20.77	19.77	20.77
Canton, Ohio	20.55	20.55	19.55	20.55
From Cleveland and Youngstown	19.50	19.50	18.50	19.50
Columbus, Ohio	20.94	20.94	19.94	20.94
From Hamilton, Ohio	20.26	20.26	19.26	20.26
Mansfield, Ohio	20.77	20.77	19.77	20.77
From Cleveland and Toledo	20.55	20.55	19.55	20.55
Indianapolis	19.50	19.50	18.50	19.50
From Hamilton, Ohio	20.94	20.94	19.94	20.94
St. Paul	20.26	20.26	19.26	20.26
From Duluth	21.04	21.04	20.04	21.04
Des Moines, Iowa	20.26	20.26	19.26	20.26
From Chicago	20.26	20.26	19.26	20.26
Kansas City	21.04	21.04	20.04	21.04
From Granite City	20.26	20.26	19.26	20.26

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.	\$23.50
Johnson City, Tenn.	23.50
Del'd Chicago	29.15

GRAY FORGE PIG IRON

Valley furnace	\$18.00
Pittsburgh district furnace	18.00

CHARCOAL PIG IRON

Lake Superior furnace	\$21.00
Delivered Chicago	24.04
Delivered Buffalo	24.28

CANADA

Pig Iron

Per gross ton:
Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	\$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	21.00

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	\$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.50

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

	Per Gross Ton
Domestic, 80% (carload)	\$85.00

Spiegeleisen

Per Gross Ton Furnace	
Domestic 19 to 21%	\$26.00

Electric Ferrosilicon

	<i>Per Gross Ton Delivered</i>
50% (carloads)	\$77.50
50% (ton lots)	85.00
75% (carloads)	126.00
75% (ton lots)	136.00
14% to 16% (f.o.b.) Welland, Ont. (in carloads) (duty paid)....	31.00
14% to 16% (less carloads).....	38.50

Silvery Iron

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton	Per Gross Ton
6%.....\$22.75	12%.....\$29.25
7%.....23.75	13%.....30.25
8%.....24.75	14%.....31.25
9%.....25.75	15%.....32.25
10%.....26.75	16%.....33.25
11%.....27.75	17%.....34.25

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton	Per Gross Ton
10%.....\$27.75	14%.....\$33.25
11%.....28.75	15%.....34.25
12%.....29.75	16%.....35.25
13%.....30.75	17%.....36.25

Manganese 1 1/4 to 3%, \$1 a ton additional. For each unit of manganese over 3%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 ton additional.

Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W, del., carloads	\$1.35 to \$1.45
Ferrotungsten, less carloads, 1.45 to 1.55	
Ferrosilicon, 4 to 6% carbon and up, 65 to 70% Cr. per lb. contained Cr. delivered, in carloads	10.90c.
Ferrosilicon, 3%	16.50c. to 17.00c.
Ferrosilicon, 1%	17.50c. to 18.00c.
Ferrosilicon, 0.10%	19.50c. to 20.00c.
Ferrosilicon, 0.08%	20.00c. to 20.50c.
Ferrovandium, del. per lb. contained V	\$2.70 to \$2.90
Ferrocobalt, 15 to 18% Ti, 6 to 8% C, f.o.b. furnace carload and contract per net ton	\$137.50
Ferrophosphorus, electric, or blast furnace material, in carloads, 18% Rockdale, Tenn., base, per gross ton with \$2 unitage	50.00
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with \$2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	\$33.00
Ton lots or less per ton	45.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	90.00
2% carbon grade	85.00
1% carbon grade	105.00
Spot prices	\$5 a ton higher

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$12.00 to \$12.50
No. 2 heavy melting steel	10.50 to 11.00
No. 2 railroad wrought	12.00 to 12.50
Scrap rails	12.00 to 12.50
Rails 3 ft. and under	14.00 to 14.50
Compressed sheet steel	11.50 to 12.00
Hand bundled sheet steel	10.50 to 11.00
Hvy. steel axle turnings	9.00 to 9.50
Machine shop turnings	8.00 to 8.50
Short shov. turnings	8.00 to 8.50
Short mixed borings and turnings	5.25 to 5.75
Cast iron borings	5.25 to 5.75
Cast iron car wheels	11.50 to 12.00
Heavy breakable cast	11.00 to 11.50
No. 1 cast	11.50 to 12.00
Railr. knuckles and couplers	14.00 to 14.50
Rail. coil and leaf springs	14.00 to 14.50
Bolled steel wheels	14.00 to 14.50
Low phos. billet crops	14.25 to 14.75
Low phos. sheet bar crops	14.25 to 14.75
Low phos. plate scrap	13.00 to 13.50
Low phos. punchings	13.50 to 14.00
Steel car axles	13.50 to 14.00

CHICAGO

Delivered Chicago district consumers: Per Gross Ton	
Heavy melting steel	\$9.50 to \$10.00
Automobile hvy. melt.	8.25 to 8.75
Shoveling steel	8.50 to 9.00
Hydraulic comp. sheets	8.50 to 9.00
Drop forge flashings	8.25 to 8.75
No. 1 busheling	8.25 to 8.75
Bolled car wheels	10.75 to 11.25
Railroad tires	10.75 to 11.25
Railroad leaf springs	10.75 to 11.25
Axis turnings	8.50 to 9.00
Steel couplers and knuckles	8.50 to 11.00
Coil springs	11.00 to 11.50
Axis turnings (elec. fur.)	8.50 to 9.00
Low phos. punchings	11.00 to 11.50
Low phos. plates, 12 in. and under	11.00 to 11.50
Cast iron borings	5.25 to 5.75
Short shoveling turnings	5.25 to 5.75
Machine shop turnings	4.50 to 5.00
Rolling rails	10.25 to 10.75
Steel rails, less than 3 ft.	10.75 to 11.25
Steel rails, less than 2 ft.	11.50 to 12.00
Angle bars, steel	10.00 to 10.50
Cast iron car wheels	10.00 to 10.50
Railroad malleable	9.50 to 10.00
Agricultural malleable	8.00 to 8.50

Per Net Ton

Iron car axles	\$13.50 to \$14.00
Steel car axles	12.50 to 13.00
No. 1 railroad wrought	9.00 to 9.50
No. 2 railroad wrought	8.25 to 8.75
No. 2 busheling	5.00 to 5.50
Locomotive tires, smooth	9.50 to 10.00
Pipe and flues	5.00 to 5.50
No. 1 machinery cast	8.50 to 9.00
Clean automobile cast	9.50 to 10.00
No. 1 railroad cast	7.50 to 8.00
No. 1 agricultural cast	7.50 to 8.00
Store plate	5.25 to 5.75
Grate bars	5.25 to 5.75
Brake shoes	6.00 to 6.50

PHILADELPHIA

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$10.50 to \$11.00
No. 2 heavy melting steel	9.00 to 9.50
No. 1 railroad wrought	11.00 to 11.50
Bundled sheets	10.00 to 10.50
Hydraulic compressed, new	10.00 to 10.50
Hydraulic compressed, old	6.50 to 7.00
Machine shop turnings	5.50 to 6.00
Heavy axle turnings	8.50 to 9.00
Cast borings	5.00 to 5.50
Heavy breakable cast	10.00 to 10.25
Store plate (steel work)	8.50 to 9.00
No. 1 low phos. heavy	13.00 to 14.00
Couplers and knuckles	13.00 to 13.50
Bolled steel wheels	13.00 to 13.50
No. 1 blast furnace	5.00 to 5.50
Spec. iron and steel pipe	8.00 to 8.50
Shafting	16.00 to 16.50
Steel axles	16.00 to 16.50
No. 1 forge fire	9.00 to 9.50
Cast iron car wheels	10.50 to 11.00
No. 1 cast	10.50 to 11.50
Cast borings (chem.)	12.00 to 14.00
Steel rails for rolling	12.00

CINCINNATI

Dealers' buying prices per gross ton:	
Heavy melting steel	\$7.25 to \$7.75
Scrap rails for melting	8.50 to 9.00
Loose sheet clippings	4.00 to 4.50
Bundled sheets	6.00 to 6.50
Cast iron borings	4.50 to 5.00
Machine shop turnings	4.50 to 5.00
No. 1 busheling	6.00 to 6.50
No. 2 busheling	2.75 to 3.25
Rails for rolling	9.00 to 9.50
No. 1 locomotive tires	8.50 to 9.00
Short rails	11.50 to 12.00
Cast iron car wheels	8.00 to 8.50
No. 1 machinery cast	9.25 to 9.75
No. 1 railroad cast	8.50 to 9.00
Burnt cast	6.00 to 6.50
Store plate	6.00 to 6.50
Agricultural malleable	8.00 to 8.50
Railroad malleable	8.25 to 8.75

CLEVELAND

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$9.00 to \$9.50
No. 2 heavy melting steel	8.50 to 9.00
Compressed sheet steel	9.00 to 9.50
Light bundled sheet stampings	6.50 to 7.00
Drop forge flashings	8.00 to 8.50
Machine shop turnings	6.25 to 6.75
Short shoveling turnings	6.50 to 7.00
No. 1 busheling	8.00 to 8.50
Steel axle turnings	8.50 to 9.00
Low phos. billet crops	13.50 to 14.50
Cast iron borings	6.50 to 7.00
Mixed borings and short turnings	6.50 to 7.00
No. 2 busheling	6.50 to 7.00
No. 1 cast	10.50 to 11.00
Railroad grate bars	7.00 to 7.50
Store plate	6.50 to 7.00
Rails under 3	14.00 to 14.50
Rails for rolling	15.50 to 16.00
Railroad malleable	11.50 to 12.00
Cast iron car wheels	9.75 to 10.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:	
No. 1 heavy melting steel	\$10.00 to \$10.50
No. 2 heavy melting scrap	8.75 to 9.25
Scrap rails	9.50 to 10.00
New hydraulic comp. sheets	8.75 to 9.25
Old hydraulic comp. sheets	7.50 to 8.00
Drop forge flashings	8.75 to 9.25
No. 1 busheling	8.75 to 9.25
Hvy. steel axle turnings	6.50 to 7.00
Machine shop turnings	5.00 to 5.50
Knuckles and couplers	12.00 to 12.50
Coil and leaf springs	12.00 to 12.50
Bolled steel wheels	12.00 to 12.50
Rails under 3	14.00 to 14.50
Low phos. billet crops	11.75 to 12.25
Short shov. steel turnings	5.50 to 6.00
Short mixed borings and turnings	5.50 to 6.00
Cast iron borings	5.50 to 6.00
No. 2 busheling	5.00 to 5.50
Cast iron car wheels	10.50 to 11.00
Iron axles	10.50 to 11.00
No. 1 machinery cast	11.00 to 11.50
No. 1 cupola cast	9.00 to 9.50
Store plate	8.75 to 9.25
Steel rails, 3 ft. and under	12.00 to 12.50
Cast iron car wheels	10.00 to 10.50
Industrial malleable	11.00 to 12.00
Railroad malleable	11.00 to 12.00
Chemical borings	7.00 to 7.50

BOSTON

Dealers' buying prices per gross ton:	
*No. 1 heavy melting steel	\$7.75 to \$8.00
*No. 1 heavy melting steel	5.50 to 6.00
*Scrap rails	5.50 to 6.00
*No. 2 steel	6.50 to 6.75
No. 2 steel	5.00 to 5.25
Breakable cast	6.00 to 6.50
Machine shop turnings	2.25 to 2.50
Bundled skeleton, long	4.75 to 5.00
Forward flashings	5.00 to 5.50
Shafting	11.50 to 12.00
Steel car axles	11.25 to 11.75
Cast iron borings, chemical	6.00 to 7.00
Store plate	4.00 to 4.25
Per gross ton delivered consumers' yards:	
Textile cast	\$9.00 to \$9.50
No. 1 machinery cast	9.00 to 9.50
Store plate	6.00 to 6.50
Railroad malleable	11.00 to 11.50

*Delivered local army base.

NEW YORK

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$7.00 to \$7.50
No. 2 heavy melting steel	\$5.50 to \$7.00
Heavy breakable cast	6.25 to 6.75
No. 1 machinery cast	7.25 to 7.75
No. 2 cast	6.50 to 7.00
Store plate	5.75 to 6.25
Steel car axles	12.50 to 13.00
No. 1 railroad wrought	6.50 to 7.00
No. 1 yard wrought, long	6.50 to 7.00
Spec. iron and steel pipe	4.50 to 5.00
Forge fire	5.50 to 6.00
Rails for rolling	9.00 to 9.50
Short shoveling turnings	2.50 to 3.00
Machine shop turnings	2.50 to 3.00
Cast borings	3.50 to 3.75
No. 1 blast furnace	2.00 to 2.50
Cast borings (chemical)	11.00 to 11.50
Unprepared yard iron and steel	4.00 to 4.50
Per gross ton, delivered local foundries:	
No. 1 machinery cast	\$10.50
No. 1 hvy. cast (cupola size)	9.50
No. 2 cast	8.00

*For direct car loading only.

†Loading on barge.

BIRMINGHAM

Per gross ton delivered consumers' yards:	
Heavy melting steel	\$9.00
Scrap steel rails	10.00
Short shoveling turnings	6.50
Store plates	6.50
Steel axles	10.00 to 10.50
Iron axles	10.00 to 10.50
No. 1 railroad wrought	6.50
Rails for rolling	11.00 to 12.00
No. 1 cast	9.50 to 10.00
Tramcar wheels	9.00 to 9.50
Cast iron borings, chem.	8.00

ST. LOUIS

Per gross ton delivered consumers' yards:	
Selected heavy steel	\$8.75 to \$9.25
No. 1 heavy melting	7.75 to 8.25
No. 2 heavy melting	6.50 to 7.00
No. 1 locomotive tires	9.50 to 10.00
Misc. stand-sec. rails	9.25 to 9.75
Railroad springs	10.00 to 10.50
Bundled sheets	6.00 to 6.50
No. 2 railroad wrought	8.00 to 8.50
No. 1 busheling	5.00 to 5.50
Cast iron borings and shoveling turnings	2.50 to 3.00
Rails for rolling	9.50 to 10.00
Machine shop turnings	2.50 to 3.00
Heavy turnings	5.50 to 6.00
Steel car axles	11.25 to 11.75
Iron car axles	13.00 to 13.50
No. 1 railroad wrought	5.50 to 6.00
Steel rails less than 3 ft.	10.75 to 11.25
Steel angle bars	9.00 to 9.50
Cast iron car wheels	7.00 to 7.50
No. 1 machinery cast	8.50 to 9.00
Railroad malleable	8.50 to 9.00
No. 1 railroad cast	8.50 to 9.00
Store plate	6.50 to 7.00
Agricult. malleable	8.50 to 9.00

DETROIT

Dealers' buying prices per gross ton:	
Heavy melting steel	\$7.50 to \$8.00
Borings and short turnings	5.25 to 5.75

ORES, FLUORSPAR, COKE, FUEL, REFRACTORIES

Lake Superior Ores

Delivered Lower Lake Ports Per Gross Ton	
Old range, Bessemer, 51.5% iron	\$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi, Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.10

Foreign Ore

C.I.F. Philadelphia or Baltimore Per Unit	
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algeria	9.50c.
Iron, low phos., Swedish, average 68% iron	9.50c.
Iron, basic or foundry, Swedish, aver. 65% iron	9c.
Iron, basic or foundry, Russian, aver. 65% iron	9c.
Manganese, Caucasian, washed 52% 48%	26c.
Manganese, African, Indian, 44-48%	21c.
Manganese, African, Indian, 49-51%	24c.
Manganese, Brazilian, 46 to 48%	20c.
Per Net Ton Unit	
Tungsten, Chinese, wolframite, duty paid, delivered	\$17.50 to \$18.50
Tungsten, domestic scheelite, delivered	17.00

Per Gross Ton	
Chrome, 45%, Cr ₂ O ₃ , crude, c.i.f. Atlantic Seaboard	\$17.00
Chrome, 48%, Cr ₂ O ₃ , c.i.f. Atlantic Seaboard	20.00

*Quotations nominal in absence of sales. †Nominal; no supplies available.

Fluorspar

Per Net Ton	
Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines for all-rail shipment	\$15.50 to \$16.00
Same grade for Ohio River barge shipment for Kentucky and Illinois River landings	17.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	\$15.50 to 16.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	19.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2% silicon, f.o.b. Illinois and Kentucky mines	30.00

COKE, COAL AND FUEL OIL

Coke

Per Net Ton	
Furnace, f.o.b. Connellsville	\$8.85
Prompt	
Foundry, f.o.b. Connellsville	\$4.60 to 5.10
Prompt	
Foundry, by-product, Chicago, orant, for delivery outside switching district	8.50
Foundry, by-product, delivered in Chicago switching district	9.25
Foundry, by-product, New England, delivered	11.00
Foundry, by-product, Newark or Jersey City, del'd	\$3.20 to 3.81
Foundry, by-product, Phila.	9.00

Long turnings	\$3.75 to \$4.25
No. 1 machinery cast	9.50 to 10.00
Automotive cast	10.25 to 10.75
Hydraulic comp. sheets	8.00 to 8.50
Store plate	6.25 to 6.75
New factory busheling	6.50 to 7.00
Old No. 2 busheling	4.00 to 4.50
Sheet clippings	4.50 to 5.00
Flashings	6.75 to 7.25
Low phos. plate scrap	8.50 to 9.00

CANADA

Dealers' buying prices per gross ton:	
Toronto Montreal	
Heavy melting steel	\$5.50 \$5.50
Rails scrap	6.00 4.50
Machine shop turnings	2.50 2.50
Boiler plate	4.50 4.50
Boiler axle turnings	2.50 2.50
Cast borings	3.00 3.00
Steel borings	2.00 2.00
Wrought pipe	2.50 2.50
Steel axles	4.50 4.00
Axles wrought iron	4.50 4.50
No. 1 machinery cast	7.75 9.00
Store plate	4.50 5.00
Standard car wheels	7.25 7.00
Malleable	6.75 7.00

Foundry, by-product, Cleveland, delivered	\$9.25
Foundry, Birmingham	6.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

Per Net Ton	
Mine run steam coal, f.o.b. W. Pa. mines	\$1.80 to \$2.05
Mine run coking coal f.o.b. W. Pa.	2.05 to 2.25
Gas coal, 1/2-in. f.o.b. Pa. mines	2.25 to 2.55
Mine run gas coal f.o.b. Pa. mines	2.05 to 2.45
Steam slack, f.o.b. W. Pa. mines	1.55 to 1.65
Gas slack, f.o.b. W. Pa. mines	1.90 to 2.10

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 2 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. del'd Chicago	
No. 3 industrial fuel oil	3.88c.
No. 5 industrial fuel oil	3.38c.

Per Gal. f.o.b. Cleveland	
No. 3 distillate	5.50c.
No. 4 industrial	5.25c.
No. 5 industrial	4.90c.

REFRACTORIES

Fire Clay Brick

Per 1000 f.o.b. Works	
High-heat intermediate Duty Brick	
Pennsylvania	\$45.00
Maryland	40.00
New Jersey	35.00
Ohio	40.00
Kentucky	45.00
Missouri	40.00
Illinois	45.00
Ground fire clay, per ton	7.00

Chrome Brick

Per Net Ton	
Standard size	\$45.00

Silica Brick

Per 1000 f.o.b. Works	
Pennsylvania	\$45.00
Chicago	34.00
Birmingham	35.00
Silica clay, per ton	8.00

Magnesite Brick

Per Net Ton	
Standard size, burned, f.o.b. Baltimore and Chester, Pa.	\$65.00
Unburned, f.o.b. Baltimore	55.00

Warehouse Prices for Steel Products

PITTSBURGH	
	Base per Lb.
Plates	3.15c.
Structural shapes	3.15c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.90c.
Cold-finished and screw stock:	
Rounds and hexagons	3.45c.
Squares and flats	3.45c.
Hoops and bands under 1/4 in.	3.20c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.30c.
Galv. sheets (No. 24), 25 or more bundles	3.95c.
Hot-rolled sheets (No. 10)	2.95c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	\$3.69
Splices, large	2.90c.
Track bolts, all sizes, per 100 count, 65 per cent off list.	
Machine bolts, 100 count, 65 per cent off list.	
Carriage bolts, 100 count, 65 per cent off list.	
Nuts, all styles, 100 count, 65 per cent off list.	
Large rivets, base per 100 lb.	\$3.50
Wire, black, soft ann'd, base per 100 lb.	*2.70
Wire, galv. soft, base per 100 lb.	*2.925
Common wire nails, per keg	*2.834
Cement coated nails, per keg	*2.834

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 9999 lb.
*Delivered in Pittsburgh switching district.

CHICAGO	
	Base per Lb.
Plates and structural shapes	3.20c.
Soft steel bars	2.95c.
Cold-fin. steel bars:	
Rounds and hexagons	3.50c.
Flats and squares	3.50c.
Hot-rolled strip	3.30c.
Hot-rolled annealed sheets (No. 24)	3.85c.
Galv. sheets (No. 24)	4.55c.
Hot-rolled sheets (No. 10)	3.05c.
Spikes (keg lots)	3.50c.
Track bolts (keg lots)	4.05c.
Rivets, structural (keg lots)	3.65c.
Rivets, boiler (keg lots)	3.75c.
Per Cent Off List	
Machine bolts	.60 and 5
Carriage bolts	.60 and 5
Lag screws	.60 and 5
Hot-pressed nuts, sq. tap. or blank	.60 and 5
Hot-pressed nuts, hex. tap or blank	.60 and 5
Hex. head cap screws	.80
Cup point set screws	.70 and 10
Flat head bright wood screws	.37 1/2 and 10
Spring cotter pins	.50
Store bolts in full packages	.70
Rd. hd. tank rivets, 7/16 in. and smaller	.57 1/4
Wrought washers	\$4.50 off list
No. 8 black ann'd wire per 100 lb.	\$3.85
Com. wire nails, base per keg	3.05
Cement c'd nails, base per keg	3.05

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.

NEW YORK	
	Base per Lb.
Plates, 1/4 in. and heavier	3.40c.
Structural shapes	3.37c.
Soft steel bars, small shapes	3.22c.
Iron bars	3.22c.
Iron bars, swed. charcoal	6.50c to 7.25c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.92c.
Flats and squares	4.42c.
Cold-rolled; strip, soft and quarter hard	3.32c.
Hoops	3.52c.
Bands	3.52c.
Hot-rolled sheets (No. 10)	3.27c.
Hot-rolled ann'd sheets (No. 24*)	3.35c.
Galvanized sheets (No. 24*)	4.50c.
Long term sheets (No. 24)	5.20c.
Standard tool steel	11.00c.
Wire, black annealed (No. 10)	3.25c.
Wire, galv. (No. 10)	3.85c.
Tire steel, 1 x 1/4 in. and larger	3.65c.
Open hearth spring steel	4.00c. to 10.00c.
Common wire nails, base, per keg	\$3.21

Machine bolts, cut thread:	
	Off List
All diameters	70
Carriage bolts, cut thread:	
All diameters	70
Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	\$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS	
	Base per Lb.
Plates and struc. shapes	3.44c.
Bars, soft steel or iron	3.19c.
Cold-fin. rounds, shafting, screw stock	3.74c.
Hot-rolled annealed sheets (No. 24)	4.09c.
Galv. sheets (No. 24)	4.79c.
Hot-rolled sheets (No. 10)	3.29c.
Black corrug. sheets (No. 24)	4.09c.
*Galv. corrug. sheets	4.79c.
Structural rivets	3.99c.
Boiler rivets	4.09c.
Per Cent Off List	
Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws, fittings up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts:	
1000 lb. or over	.70 and 10
200 to 999 lb.	.67 1/2 and 10
100 to 199 lb.	.65 and 10
Less than 100 lb.	.60 and 10

*No. 26 and lighter take special prices.

PHILADELPHIA	
	Base per Lb.
*Plates, 1/4-in. and heavier	2.95c.
*Structural shapes	2.95c.
*Soft steel bars, small shapes, iron bars (except bands)	2.90c.
*Reinforc. steel bars, sq. twisted and deformed	2.955c.
*Cold-finished steel bars	3.73c.
*Steel hoops	3.40c.
*Steel bands, No. 12 and 3/16 in., incl.	3.15c.
Spring steel	5.00c.
Hot-rolled anneal. sheets (No. 24)	3.55c.
Galvanized sheets (No. 24)	4.25c.
Hot-rolled annealed sheets (No. 10)	3.05c.
Diam. pat. floor plates, 1/4 in.	4.95c.
Swedish iron bars	6.25c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.
*Base prices subject to deduction on orders aggregating 4000 lb. or over.
†For 50 bundles or over.
‡For less than 2000 lb.

CLEVELAND	
	Base per Lb.
Plates and struc. shapes	3.31c.
Soft steel bars	2.95c.
Reinforc. steel bars	2.10c.
Cold-finished steel bars	3.40c.
Flat-rolled steel under 1/4 in.	3.36c.
Cold-finished strip	3.00c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 24)	4.61c.
Hot-rolled sheets (No. 10)	3.11c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.56c.
Black ann'd wire, per 100 lb.	\$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.40

*Plus mill, size and quantity extras.
†Outside delivery 10c. less.

CINCINNATI	
	Base per Lb.
Plates and struc. shapes	3.40c.
Bars, soft steel or iron	3.15c.
New billet reinforce. bars	3.25c.
Rail steel reinforce. bars	3.25c.
Hoops and bands, 3/16 in. and lighter	3.45c.
Cold-finished bars	3.70c.
Hot-rolled annealed sheets (No. 24)	4.00c.
Galv. sheets (No. 24)	4.70c.
Hot-rolled sheets (No. 10)	3.20c.
Structural rivets	4.35c.
Small rivets	.55 per cent off list
No. 9 ann'd wire, per 100 lb. (1000 lb. or over)	\$2.91
Com. wire nails, base per keg (1 to 24 kegs)	3.50
25 to 50 kegs	3.30
Larger quantities	3.10
Cement c'd nails, base 100-lb. keg	3.50
Chain, 1-in., per 100 lb.	8.35
Net per 100 Ft.	
Seamless steel boiler tubes, 2-in.	\$19.03
4-in.	44.96
Lap-welded steel boiler tubes, 2-in.	18.10
4-in.	42.32

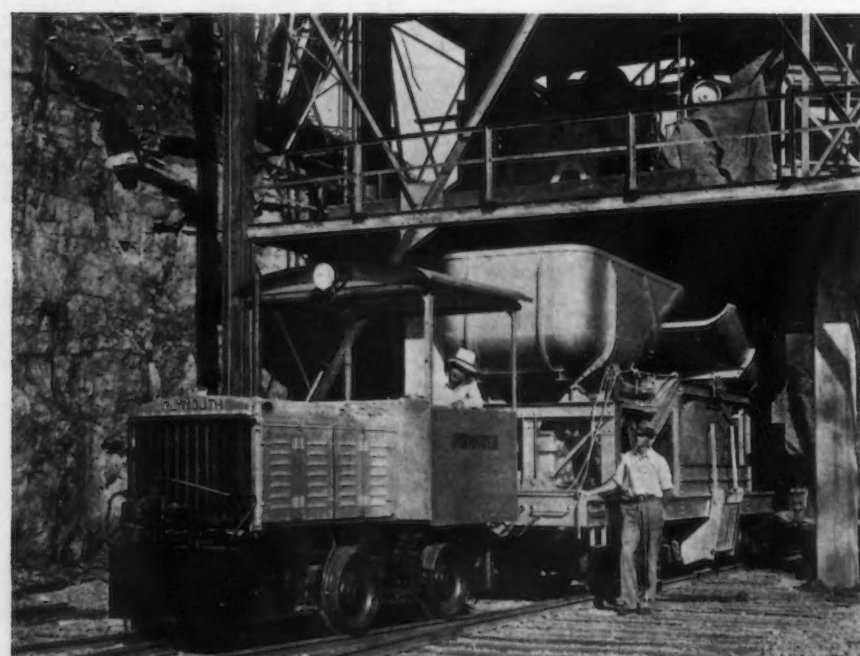
BUFFALO	
	Base per Lb.
Plates	3.37c.
Struc. shapes	3.25c.
Soft steel bars	3.00c.
Reinforcing bars	2.60c.
Cold-fin. flats and sq.	3.55c.
Round and hex.	3.55c.
Cold-rolled strip steel	3.19c.
Hot-rolled annealed sheets (No. 24)	4.05c.
Heavy hot-rolled sheets, 3/16 in., 24 to 48 in. wide	3.62c.
Galv. sheets (No. 24)	4.70c.
Bands	3.42c.
Hoops	3.42c.
Hot-rolled unannealed sheets	3.17c.
Com. wire nails, base per keg	\$3.25
Black wire, base per 100 lb.	3.55c.

BOSTON	
	Per Lb. Base
Beams, channels, angles, tees, zees	3.52c.
H beams and shapes	3.52c.
Plates—sheared, tank and univ. mill, 1/4 in. thick and heavier	3.53c.
Floor plates, diamond pattern	5.33c.
Bar and bar shapes (mild steel)	3.30c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.60c. to 4.60c.
Half rounds, half ovals, ovals and bevels	4.55c.
Tire steel	4.55c.
Cold-finished rounds and hexagons	5.25c.
Cold-rolled strip steel	3.245c.
Cold-finished squares and flats	4.30c.
Blue annealed sheets, No. 10 gal.	3.17c.
One pass cold-rolled sheets No. 24 ga.	4.15c.
Galvanized steel sheets, No. 24 ga.	4.85c.
Lead coated sheets, No. 24 ga.	5.80c.

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

PACIFIC COAST	
	Base per Lb.
	San Francisco Los Angeles Seattle
Plates, tank and U. M.	3.55c. 3.70c. 3.55c.
Shapes, standard	3.55c. 3.70c. 3.55c.
Soft steel bars	3.60c. 3.70c. 3.60c.
Reinforcing bars	3.50c. 3.50c. 3.50c.
Hot-rolled annealed sheets (No. 24)	4.40c. 4.45c. 4.40c.
Hot-rolled sheets (No. 10)	3.75c. 3.80c. 3.75c.
Galv. sheets (No. 24)	5.00c. 5.05c. 5.00c.
Cold finished steel:	
Rounds	5.95c. 5.95c. 4.75c.
Squares and hexagons	7.20c. 7.20c. 6.00c.
Flats	7.70c. 7.70c. 7.00c.
Common wire nails—base per keg less carload	\$3.40 \$3.25 \$3.30

All items subject to differentials for quantity.



THE Tennessee Valley Authority is using four 10-ton Plymouth-Westinghouse gas-electric locomotives of the type illustrated to haul nearly 1,000,000 cu. yd. of concrete required for the Norris Dam. These 12-ft. long locomotives are powerful and fast. The starting tractive effort with 25 per cent adhesion is 5000 lb.; the continuous tractive effort is 1650 lb. With a maximum safe speed of 23 miles per hr., the locomotives have a free running speed of 15 miles per hr., and a 10 miles per hr. speed when operating at the continuous tractive effort rating.

Primary Copper Producers Waive Sales Quotas Through December and January

Spelter Sales Heavy With Prices Unchanged—Lead Market Also Fairly Active—Tin Prices Lower With Heavier Transactions

NEW YORK, Dec. 4.—Announcement last week that primary copper producers have again agreed to waive their sales quotas for two months was somewhat depressing to the copper market. New business continues below expectations and is only sufficient to take care of secondary, custom and by-product sales requirements. It is also understood that secondary producers have again agreed to restrict their activity by about 25 per cent during December and January. Copper sales during the past week were not particularly heavy and the month's bookings amounted to only about 15,000 tons. Compared with average monthly bookings of Blue Eagle metal amounting to about 23,000 tons since the code went into effect, the showing was not encouraging. Sales yesterday

amounted to more than 1000 tons, but today's transactions do not promise to be nearly so large. March metal is now available, but is attracting little consumer interest, even though there is no immediate prospect of a change in the 9c. price. The foreign market has weakened somewhat in spite of the assurance that a meeting will be held this month to talk over some sort of a market control plan. London quotations this morning ranged from 6.70c. to 6.75c. a lb., usual Continental base ports.

Tin

Following moderately active trading last week, the market became more quiet yesterday, coincident with the decline in sterling. Sales today have also been lighter and consumers apparently desire to get some idea of

the future course of the pound before making additional commitments. Tin plate producers have been the most active takers, buying for first and second quarter of next year. Prices have also eased off slightly and the market today is quotable at 50.87½c. a lb. at New York, after reaching 51.37½c. one day last week. The London market is also dull and spot and future standard were quoted on first call this morning at £228 7s. 6d. and £228 17s. 6d., respectively. Straits metal at Singapore is quotable at £230 10s.

Lead

The market remains steady and prices are quotably unchanged at 3.50c. a lb., New York, and 3.35c., St. Louis. Sales this week have been moderately satisfactory, although not much interest is being shown in January metal. The December position is almost entirely sold and one producer is asking premiums on certain grades. The ore market remains firm at \$32 a ton. Production last week totaled about 1100 tons, while shipments were 700 tons.

Zinc

With sales of more than 7500 tons last week, prices strengthened to 4.05c., New York, and 3.70c., East St. Louis, at which levels they still appear to be well maintained. Yesterday and today the market has been more quiet and consumers are showing little interest. No particular activity is reported in the ore market and the flotation and mill grades are holding at \$24 and \$25 a ton respectively. Last week's production amounted to 8200 tons, against shipments of 7700 tons. Sales totaled about 5300 tons.

The Week's Prices. Cents Per Pound for Early Delivery

	Nov. 28	Nov. 30	Dec. 1	Dec. 3	Dec. 4
Electrolytic copper, N. Y.*.....	8.75	8.75	8.75	8.75	8.75
Lake copper, N. Y.....	9.12½	9.12½	9.12½	9.12½	9.12½
Straits tin, Spot, New York....	51.37½	51.10	.....	51.00	50.87½
Zinc, East St. Louis.....	3.70	3.70	3.70	3.70	3.70
Zinc, New York.....	4.05	4.05	4.05	4.05	4.05
Lead, St. Louis.....	3.35	3.35	3.35	3.35	3.35
Lead, New York.....	3.50	3.50	3.50	3.50	3.50

*Refinery quotations; price ¼c. higher delivered in Connecticut.
Aluminum, virgin 99 per cent plus, 19c. to 22c. a lb., delivered.
Aluminum, remelt No. 12 (alloy), carload lots delivered, 14c. a lb., average for week.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 13.75c. a lb., New York.
Brass ingots, 85-5-5-5, 8.25c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig.....	52.50c. to 53.50c.
Tin, bar.....	54.50c. to 55.50c.
Copper, Lake.....	10.25c. to 11.00c.
Copper, electrolytic.....	10.00c. to 10.50c.
Copper, castings.....	9.75c. to 10.75c.
*Copper sheets, hot-rolled.....	16.00c.
*High brass sheets....	14.25c.
*Seamless brass tubes.....	16.00c.
*Seamless copper tubes.....	16.25c.
*Brass rods.....	12.75c.
Zinc, slabs.....	5.75c. to 6.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over.....	10.25c.
Lead, American pig....	4.37½c. to 5.37½c.
Lead, bar.....	5.37½c. to 6.37½c.
Lead, sheets.....	7.25c.
Antimony, Asiatic.....	15.50c. to 16.50c.
Alum., virgin, 99 per cent, plus.....	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent.....	18.00c. to 19.00c.
Solder, ½ and ½.....	31.00c. to 32.00c.
Babbitt metal, commercial grades.....	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig.....	55.50c.
Tin, bar.....	57.50c.

Copper, Lake.....	10.00c.
Copper, electrolytic.....	10.00c.
Copper, castings.....	9.75c.
Zinc, slab.....	5.75c. to 6.00c.
Lead, American pig.....	4.50c. to 4.75c.
Lead, bar.....	7.75c.
Antimony, Asiatic.....	15.25c.
Babbitt metal, medium grade.....	18.50c.
Babbitt metal, high grade.....	59.50c.
Solder, ½ and ½.....	33.25c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible.....	5.37½c.	6.12½c.
Copper, hvy. and wire.....	5.25c.	5.75c.
Copper, light and bottoms.....	4.25c.	4.75c.
Brass, heavy.....	2.75c.	3.37½c.
Brass, light.....	2.00c.	2.75c.
Hvy. machine composition.....	4.37½c.	4.87½c.
No. 1 yel. brass turnings.....	3.62½c.	4.12½c.
No. 1 red brass or compos. turnings.....	3.87½c.	4.37½c.
Lead, heavy.....	2.62½c.	3.00c.
Zinc.....	1.87½c.	2.25c.
Cast aluminum.....	9.62½c.	10.75c.
Sheet aluminum.....	11.00c.	12.50c.

Ingot Brass and Bronze

The Non-Ferrous Ingot Metal Institute reports that in the 28-day period ended Nov. 2 the average prices paid for commercial 80-10-10 and commercial 85-5-5-5 brass ingots were 9.806c. a lb. and 8.278c. a lb. respectively. In the previous comparable period these figures were 10.106c. and 8.759c. respectively.

Non-Ferrous Averages

THE average prices of the major non-ferrous metals for November based on daily quotations in the THE IRON AGE, are as follows:

	Average
Electrolytic copper, N. Y.†.....	8.75c. a lb.
Lake copper, Eastern delivery*.....	9.12½c. a lb.
Straits tin, Spot, N. Y.....	51.24c. a lb.
Zinc, East St. Louis.....	3.73c. a lb.
Zinc, New York.....	4.08c. a lb.
Lead, St. Louis.....	3.42c. a lb.
Lead, New York.....	3.57c. a lb.

*Blue Eagle copper. †Price ¼c. higher in Connecticut Valley.

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Fabricated Structural Steel

Awards Light—New Projects Decline

WITH lettings few and in small tonnages, structural steel bookings total only 3850 tons, the lowest for any week this year. New projects of 11,890 tons are mostly for bridge work and compare with 10,000 tons last week and 7625 tons two weeks ago. Sheet steel piling awards call for 26,160 tons, of which 26,000 tons is for the Grand Coulee dam at Almira, Wash. New sheet steel piling projects will require 3900 tons. Plate inquiries total 4055 tons. Structural steel contracts in November, at 64,025 tons, compare with 54,230 tons in October and 41,780 tons in September. Structural steel awards for the week follow:

NORTH ATLANTIC STATES

Elmsford, N. Y., 240 tons, State highway bridge, to Harris Structural Steel Co.

Pittsburgh, 200 tons, Fort Pitt Bedding Co. building, to Fort Pitt Bridge Works Co.

Baltimore, 285 tons, building for Crown Cork & Seal Co., to McClintic-Marshall Corp.

Penns Grove, N. J., 225 tons, high school, to McClintic-Marshall Corp.

Philadelphia, 100 tons, substation for Philadelphia-Camden bridge approach, to Schoemaker Bridge Co.

New London, Conn., 160 tons of sheet steel piling and 30 tons of structural steel for Point Judith improvement project, to Carnegie Steel Co.

CENTRAL STATES

Toledo, Ohio, 390 tons, Closure Service Co. building, to Fort Pitt Bridge Works Co.

Willow Island, Neb., 210 tons, bridge span, to St. Joseph Structural Steel Co.

Alma, Wis., 275 tons, truss spans, to Milwaukee Bridge Co.

Hibbing, Minn., 425 tons, recreation building, to American Bridge Co.

Medford, Minn., 100 tons, bridge, to McClintic Marshall Corp.

WESTERN STATES

Denver, 100 tons, bridge, to Minneapolis-Moline Power Implement Co.

Santa Ana, Cal., 300 tons, school, to Consolidated Steel Corp.

Compton, Cal., 100 tons, junior college administration building, to Minneapolis-Moline Power Implement Co.

Long Beach, Cal., 150 tons, auditorium, to Pacific Iron & Steel Co.

Grand Coulee Dam, Wash., 26,000 tons of sheet steel piling, to Inland Steel Co.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Taunton, Mass., 300 tons, State hospital.

Broome County, N. Y., 1300 tons, highway bridge; bids Dec. 18.

Brooklyn, 900 tons of sheet steel piling for Pier 38; bids taken.

State of Pennsylvania, 340 tons, bridges in Armstrong, Westmoreland, and Wyoming Counties; bids at Harrisburg on Dec. 14.

State of New Jersey, 240 tons, highway bridge over Erie Railroad; bids Dec. 10.

SOUTH AND SOUTHWEST

Glasgow, Va., 400 tons, building for Blue Ridge Co.; bids Dec. 6.

Richmond, Va., 1287 tons, parcel post building; Spence Brothers, Detroit, low bidders on general contract.

Edith, Okla., 550 tons, bridge.

Gans, Okla., 1400 tons, bridge.

Abilene, Tex., 300 tons, post office.

Ralston, Okla., 1100 tons, bridge over Arkansas River.

Walters, Okla., 560 tons, bridge over Cimarron River.

CENTRAL STATES

Barnesville, Ohio, 100 tons, State bridge.

Lucas County, Ohio, 700 tons, FERA shore protection work.

Austin, Ohio, 126 tons, County bridge; bids Dec. 14.

Gary, Ind., 300 tons, grade separation work for New York Central Railroad.

Ottumwa, Iowa, 1500 tons, bridge.

Clintonville, Wis., 150 tons, State highway bridge; Ray J. Eckenrode Co., Kenosha, Wis., low bidder.

Warsaw, Mo., 150 tons, industrial building.

WESTERN STATES

Butte, Mont., 150 tons, high school, bids to be taken this month.

Folsom, Cal., 100 tons, work at State prison; bids taken Dec. 3.

Los Angeles, 165 tons, tunnel ribs for Metropolitan Water District, Spec. M-2032; bids under advisement.

Los Angeles, 100 tons, extension to transit shed on berth 177; bids soon.

Government Island, Cal., 3000 tons sheet piling, bulkhead for United States Coast Guard; bids to be taken at Washington, Dec. 13.

Nome, Alaska, 350 tons, Nizina River bridge for Alaska Road Commission; bids taken Dec. 5.

FABRICATED PLATE

AWARDS

New York, 450 tons, water pipe line for West Side, to Alco Products, Inc.

NEW PROJECTS

Niagara Falls, N. Y., 500 tons for water intake pipe.

Chicago, 200 tons, tanks.

Salt Lake City, Utah, 135 tons for Moon Lake Dam, near Duchesne, Utah; bids Feb. 4.

Ontario, Ore., 4100 tons, Malheur River and Dead Ox siphons and pipe line; Consolidated Steel Corp. low bidder.

Denver, 170 tons, power plant penstocks; Hendrie & Holthoff low bidders.

Denver, 100 tons, 8 to 20-in. pipe for Pine View dam, identical bids received.

San Diego, Cal., 2800 tons, El Capitan-Lake-side pipe line, six miles long and 48 in. in diameter; plans completed.

Los Angeles, 150 tons, for Department of Water and Power; bids taken Dec. 5.

Cast Iron Pipe

Pecos, Tex., closes bids Dec. 14 for 32,500 ft. of 4.6 and 8-in. for water supply; also for 10,000-gal. tank, pumping equipment and other waterworks equipment, including 11 miles 10,500-volt power transmission line for service at pumping station. Fund of \$300,000 has been arranged through Federal aid for waterworks. H. E. F. Helland, Frost National Bank Building, San Antonio, Tex., is consulting engineer.

Watford City, N. D., plans water pipe lines; also 75,000-gal. elevated steel tank and tower and pumping plant. Fund of \$42,000 has been secured through Federal aid. Bugenhagen, Hess & Deeter, First Avenue Building, Minot, N. D., are consulting engineers.

Quartermaster, Marine Corps, Washington, asks bids until Dec. 10 for quantity of iron pipe (Schedule 313).

Roy, N. M., plans water pipe lines; also elevated steel tank and tower and pumping station. Fund of \$40,000 has been secured through Federal aid.

Stratford, Wis., will soon purchase about

4000 ft. of 6-in. for water supply; also pumping equipment. W. G. Kirchoffer, 22 North Carroll Street, Madison, Wis., is consulting engineer.

Winchendon, Mass., plans extensions in water pipe lines. Fay, Spofford & Thorndyke, 44 School Street, Boston, are consulting engineers.

Toyah, Tex., plans water pipe lines. Fund of \$26,000 has been secured through Federal aid for this and other waterworks construction. Montgomery & Ward, Harvey-Snyder Building, Wichita Falls, Tex., are consulting engineers.

Fredonia, Kan., plans main water trunk pipe line. Special election has been called Dec. 24, to approve bonds for \$80,000 for this and other waterworks construction.

New Concord, Ohio, plans water pipe lines. Fund of \$30,000 has been arranged for this and other waterworks. Jennings & Lawrence, 12 North Third Street, Columbus, Ohio, are consulting engineers.

Marquez, Tex., closes bids Dec. 11 for water pipe lines; also for elevated tank and tower, pumping machinery and auxiliary waterworks equipment. Southwest Engineering Co., Littlefield Building, Austin, Tex., is consulting engineer.

Hot Springs, Mont., closes bids Dec. 10 for pipe lines for water supply and other waterworks equipment. Fund of \$41,000 has been secured through Federal aid. T. A. Tschereau, Kalispell, Mont., is consulting engineer.

Valparaiso, Ind., has awarded 100 tons to James B. Clow & Sons.

Mendota, Wis., has placed 12,000 ft. of 10-in. pipe for State Hospital with United States Pipe & Foundry Co.

Wisconsin Board of Control, Madison, has accepted bid of J. M. Walsh, Madison, for furnishing and laying 12,040 lin. ft. of 10-in. pressure sewer.

Madison, Wis., has placed 125 tons for city waterworks discharge line with Central Foundry Co.

Williams, Ariz., has received a grant for water system improvements which will require 600 tons.

Willington, Utah, will take bids Dec. 14 on 222 tons of 3-in.

Centerfield, Utah, will take bids Dec. 11 on 247 tons of 6-in.

Spring City, Utah, has plans calling for 516 tons of 2 to 8-in.

Gunnison, Utah, will take bids Dec. 11 on 230 tons of 6 and 8-in.

Porterville, Cal., has taken bids on 125 tons of 4 to 10-in.

Winnemucca, Nev., will take bids soon on 825 tons of 4 to 12-in.

Reinforcing Steel

Awards 900 Tons—New Projects 8775 Tons

Bordentown, N. J., 250 tons, jail buildings, to Igoo Brothers.

Delaware County, N. Y., 200 tons, mesh for highways, to American Steel & Wire Co.

Waltham, Mass., 150 tons, State hospital, to Concrete Steel Co.

Lockport, Ill., 109 tons, Sanitary District work, to Concrete Engineering Co.

Pullman, Wash., 192 tons, science building at State College, to Soule Steel Co.

NEW REINFORCING BAR PROJECTS

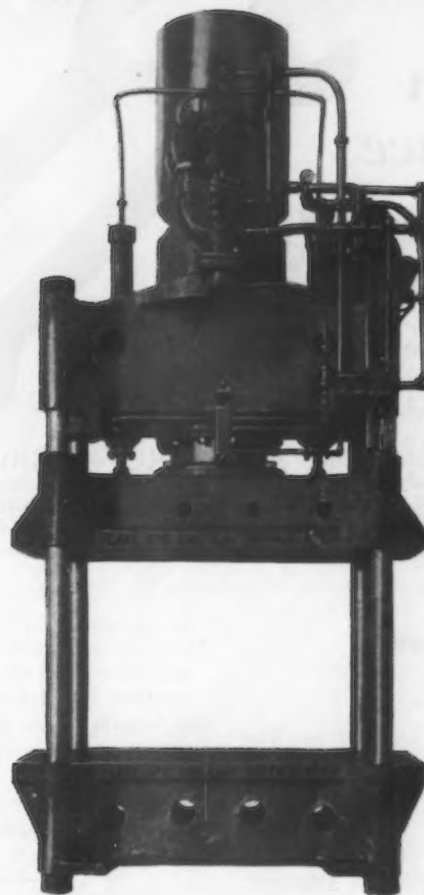
Trenton, N. J., 1100 tons, four highway projects; general contracts to be let Dec. 17.

State of Ohio, 100 tons, three highway bridges.

Salt Lake City, Utah, 435 tons of bars for Moon Lake dam near Duchesne, Utah; bids Feb. 4.

Oakland, Cal., 500 tons additional, county court house; bids Dec. 12.

LAKE ERIE'S LATEST HIGH SPEED HYDRAULIC PRESS



The press illustrated is giving unusual satisfaction in one of the country's largest airplane plants.

These presses are very efficient for numerous forming and drawing operations of sheet metal and all kind of bending and straightening work.

Note the self-contained motor driven unit providing a speed of 20 strokes per minute with highly sensitive control.

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Hydraulic presses for every need.

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68 KENMORE STATION, BUFFALO, N. Y.

San Jose, Cal., 508 tons, Almaden and Stevens Creek dams; bids advanced to Dec. 14.

Plumas County, Cal., 100 tons, State bridge over North Fork of Feather River at Rock Creek; bids Dec. 19.

San Francisco, 200 tons, Visitation Valley school; bids taken Dec. 5.

San Francisco, 200 tons, Lawton school; bids Dec. 26.

San Francisco, 2175 tons, viaduct on Trans-Bay bridge, contract No. 15; bids Dec. 20.

San Francisco, 1125 tons, viaduct approaches on Trans-Bay bridge, contract No. 15-A; bids Dec. 20.

Glendale, Cal., 128 tons, county debris dam at Brand Canyon; bids Dec. 10.

Los Angeles, 1785 tons, material for Metropolitan Water District, Spec. M-2030; bids Dec. 11.

Butte, Mont., 300 tons, high school, bids to be taken this month.

Okanogan County, Wash., 109 tons, State bridge over Methow River; bids Dec. 18.

Railroad Equipment

National Railways of Mexico have ordered 400 cars from General American Tank Car Corp.

RAILS

Santa Fe's budget calls for purchase of 27,000 tons of 112-lb. rails and 3500 tons of 90-lb. rails.

Van Sweringen Lines are planning a rail program which may call for a total of 80,000 tons.

Santa Fe will buy one Diesel switching locomotive and three Diesel coaches.

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Additional Navy Steel Placed

WASHINGTON, Dec. 4. — The Navy Department today announced awards of 289 tons of shapes for three submarines, two to be built at Portsmouth, N. H., and one at Mare Island Navy Yard. Distribution in tons was made as follows: Carnegie Steel Co., 113; Bethlehem Steel Co., 104; Phoenix Iron Works, 52, and Illinois Steel Co., 20.

Pig Iron Demand Improves at Cincinnati

CINCINNATI, Dec. 4.—While total sheet steel bookings last week reflected the loss of one business day, otherwise business has shown no abatement. On the whole, November business was at a distinctly better level than October. Even the customary inventory periods of December are not causing mills to deviate from their expectation of steady improvement. Demand is averaging about 35 per cent of mill capacity, with production keeping pace. Automotive specifications have been disappointing, but prospects of an early improvement are good. Electrical sheets are in more active demand.

Slow expansion of pig iron sales during December is indicated in slightly improved bookings. Furnace interests look for a steady rise in first quarter commitments, with demand freed from the gyrations that occurred when consumers hurried to cover before price advances. Some

improvement in the automotive melt is forecast, which, if it materializes, will offset end-of-quarter curtailment in other foundry operations.

Jobbers have been encouraged by the slow but steady growth of demand.

Mill buying of scrap is nil, despite the forward movement in prices.

St. Louis Market Is Quiet

ST. LOUIS, Dec. 4.—The reaffirmation of prices on finished iron and steel for first quarter brought out a small amount of buying, the action having been expected. However, the usual holiday lull prevailed.

Reaffirmation of prices on pig iron for first quarter had been expected by most factors, although there was a feeling that prices might be advanced. Some buying is expected to result now that the prices have been definitely fixed. The recent cold weather had tended to stimulate greatly the buying of stoves by consumers, and the foundries in the district continue at a good rate. Operations in the agricultural plants in Moline and Peoria continue satisfactory. Melt among jobbing foundries is spotty, depending upon the nature of the business.

A short interest among dealers and the prospects for early buying have caused an increase in prices on some grades of scrap although none of the mills in the St. Louis industrial district is in the market for material. No. 2 heavy melting steel, miscel-

laneous standard-section rails and rails for rolling are 25c. a ton higher, No. 1 heavy melting 50c. a ton up and railroad springs \$1 a ton higher.

Chevrolet has decided to use S.A.E. No. 5150 chromium steel instead of S.A.E. No. 6100 chrome vanadium steel for its leaf springs during the coming year. Extensive tests said to have been made by Chevrolet engineers show that the newly specified chromium steel, due to recent improvements in steel making, gives better performance for spring purposes than the chrome vanadium steel of three years ago. Chevrolet will continue to use S.A.E. No. 9260 steel, a silicon-manganese steel for the coil springs for its knee-action units for its Master series.

Federal Judge Davis at St. Louis has authorized trustees of the Wabash Railway to apply to the PWA for a loan of \$2,350,000 to complete construction of its bridge over the Missouri River at St. Charles and to apply to the Interstate Commerce Commission for approval of the project. The company began work on the bridge in 1931, but construction was suspended the same year upon appointment of receivers for the road.

Hydraulic brakes and a new type transverse leaf spring independent suspension for front wheels are outstanding features of the 1935 Studebakers announced today. The springing system is similar to that used on the Delage car in Europe. The transverse leaf spring extending between the lower ends of the steering heads consists of a large number of thin leaves of silicon chromium steel. Supplementing the suspension are double-acting hydraulic shock absorbers. The overdrive transmission unit first introduced on the Chrysler and De Soto airflow cars this year is standard equipment on the President series. The new Studebakers have the long narrow radiator pioneered by La Salle. A concave splash pan sweeping forward to a more horizontal finish at the front gives a flaring appearance to the splash pan and fenders.

Pig iron shipments to automotive foundries during November were 15 to 20 per cent greater than in October and prospects are favorable for a further improvement this month. After a brief shutdown for inventory and change-over, the Chevrolet gray iron foundry at Saginaw resumed operations on Nov. 26, making heavy castings for Chevrolet and Pontiac. The Chevrolet gear and axle and forge plants in Detroit started work again on Monday and should be in full production shortly.

Amendment to Wire Fence Code—Other News

WASHINGTON, Dec. 4.—Criticism of or objections to a proposed amendment to the code for the complete wire and iron fence industry, a subdivision of the fabricated metal products manufacturing and metal finishing and metal coating industry, must be filed with Deputy Administrator H. Ferris White, 1518 K Street, N. W., before Dec. 14. The proposed amendment would provide for the filing of price terms by all members of the industry with a confidential and disinterested agent of the supplementary code authority. The agent would make this information available to members of the industry and its customers.

COAL CUTTING AND LOADING

A coal cutting machine subdivision and a coal mine loading machine subdivision have been set up under the code for the machinery and allied products industry by approval of two amendments by the National Industrial Recovery Board.

CODE AUTHORITIES APPROVED

The NRA has announced recognition of the following as duly elected members of code authorities:

Vise Manufacturing Industry—P. D. Wright, Reed Mfg. Co., Erie, Pa.; R. J. Simmons, Rock Island Mfg. Co., Rock Island, Ill.; H. F. Seymour, Columbian Vise & Mfg. Co., Cleveland; C. S. Parker, Charles Parker Co., Meriden, Conn.; M. Kessler, Athol Machine & Foundry Co., Athol, Mass.; and W. S. Swift, American Scale Co., Kansas City, Mo.

Pipe Tool Manufacturing Industry (Division of the fabricated metal products industry)—P. D. Wright, Reed Mfg. Co., Erie, Pa.; B. I. Ashmun, Armstrong Co., Bridgeport, Conn.; Warner Bacon, Erie Tool Works, Erie, Pa.; Horace Armstrong, Armstrong Brothers Tool Co., Chicago; and Roger Tewksbury, Oster Mfg. Co., Cleveland.

Steel Tubular and Firebox Boiler Manufacturing—C. N. Tull, Spencer Heater Co., Williamsport, Pa.; Homer Addams, Fitzgibbons Boiler Co., New York; J. R. Collette, Pacific Steel Boiler Corp., Detroit; C. L. Crouse, National Radiator Corp., Johnstown, Pa.; R. B. Dixon, Kewanee Boiler Corp., Kewanee, Ill.; J. T. Dillon, Jr., Titusville Iron Works, Titusville, Pa.; J. F. Johnston, Johnston Brothers, Inc., Perrysburg, Mich.; F. B. Metcalf, International Boiler Works, East Stroudsburg, Pa.; and J. Harry Stiteler Orr & Sembower, Reading, Pa.

TRADE PRACTICE COMPLAINT COMMITTEES

The National Industrial Recovery Board has announced approval of organization and procedure plans for the following trade practice complaints committees:

Diamond Core Drill Manufacturing Industry (Division of the machinery and allied products industry)—Conditional approval given procedure plans; committee to consist of entire divisional code authority membership.

Chain Manufacturing Industry (Division of the fabricated metal products industry)—F. A. Bond, McKay Co., Pittsburgh; D. S. Brislin, Columbus McKinnon Chain Corp., Tonawanda, N. Y.; L. D. Cull, Cleveland Chain & Mfg. Co., Cleveland; F. G. Hodell, Chain Products Co., Cleveland; A. Kurz, Western Chain Products Co., Chicago; E. Littmann, Nixdorff-

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Krein Mfg. Co., St. Louis; E. W. Taylor, S. G. Taylor Chain Co., Hammond, Ind.; and A. P. VanSchaick, American Chain Co., Bridgeport, Conn.

Vitreous Enameled Ware Manufacturing Industry (Division of the fabricated metal products industry)—D. S. Hunter, D. S. Hunter & Associates, Cleveland, to act as the authorized committee.

Refrigerating Machinery Industry—Committee to consist of members of code authority.

Automatic Sprinkler Industry—Committee to consist of five members and one alternate member to be appointed by the code authority.

Pipe Nipple Manufacturing Industry—Conditional approval given procedure plan; W. V. Daugherty, Thomas Devlin Mfg. Co., Burlington, N. J.; Emmett Graham, Star Nipple Co., Chicago; and Elmer H. Young, Pottstown Pipe Products Co., Pottstown, Pa.; and administration member of the code authority.

Scrap Institute to Meet in New York

THE seventh annual convention of the Institute of Scrap Iron and Steel will be held in New York, Jan. 15 to 17. A convention committee has been appointed by the New York chapter of the institute, which will act as hosts to the members of the institute, with P. W. Bowers, P. W. Bowers & Co., as general chairman; George Betten, S. Betten & Sons, general secretary, and Thomas F. Kelly, general treasurer. The Hotel New Yorker has been selected as convention headquarters.



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that you send for the Red Book of Industrial Power Transmission, offered by the Power Transmission Council on pages 102-103 of this issue of Iron Age. If you prefer, write us and we will send you a copy together with a Case Study of Power Transmission Costs for your type of plant. . . . We are members of the Power Transmission Council.

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life of belts on any type of drive is **PLIABILITY**. MANY Schieren Belts are still giving excellent service after 30 and 40 years' use because of their extra pliability—due to *Schieren-izing*, which gives all Schieren Belting extra power transmitting capacity



SCHIEREN-IZING makes leather belting pliable

When and How to Train Welders

(Continued from Page 27)

a general idea of the procedure to follow.

After a few hours' observation, each student will then be assigned to a booth and will be given instructions in the first exercise, which consists of cutting and welding with the carbon arc. The carbon arc is used for this exercise because it is easier to maintain, and the action of the arc flame can be seen more plainly. This permits the student to become accustomed to the handling of the equipment without having to worry about the length of the arc. At this point the students are shown the method of determining whether they have reverse or straight polarity. It is very important that this be thoroughly understood, because many weld failures have been caused by the operator working with a machine that has had the polarity reversed.

First Lessons in Metallic Arc Welding

After the student has become fairly proficient in handling of the carbon arc he is started on the first lesson in metallic arc welding. A great deal of skill is required to maintain a fixed arc length and get proper fusion with this type of welding, and as most arc welding is done by this method it is very important that the student practice each lesson until very good results are secured. The beginner

starts by laying beads on a plate in a horizontal position. The necessity of using the proper current and maintaining the correct length of arc is stressed very strongly. Maintaining the proper arc proves very difficult at first, but becomes easier with practice. These exercises should be carried out with the travel in all four directions using both the straight line and weaving manipulations.

In the next lesson the student is required to lay beads on a plate inclined at an angle of 45 deg. It is necessary in this exercise that a very short and steady arc be maintained in order to get penetration and prevent the metal from rolling down the plate. Considerable practice is required in this exercise. From this point all students make welds designed so that they may be broken or polished and etched with acid; thus they may see the actual results of their work. Only in this way can they hope to learn the things to avoid and know the general appearance of a good weld. The most important exercises are the horizontal and vertical butt welds, horizontal and vertical tee welds, and plug welding. All students are instructed in the proper procedure and metals to be used in the welding of cast iron, copper, and chrome-nickel alloys. Each student is required to take a final test which includes $\frac{1}{2}$, $\frac{3}{4}$, and 1 in. horizontal tee

welds, also $\frac{1}{2}$ and $\frac{3}{4}$ in. vertical tee welds. The final test piece is a double strap butt weld; this test piece must stand a pull of not less than 40,000 lb. per sq. in. The tee welds must have not less than 90 per cent fusion.

Experience Necessary After Training

The man, of course, is not considered an expert welder upon the completion of this course. He still has many things to learn, which must be learned from experience on the job. However, the student welder, after completion of the school course, must be capable of making on mild steel, all the welds given in the schedule of training; he should also be capable of welding at least one other grade of steel or alloy, and must pass all tests satisfactorily.

The importance of having a proper training schedule and expert instructors in the school cannot be emphasized too strongly, but along with this the school must be properly equipped so that instruction may be given in gas welding and cutting, as well as in arc welding. The school should also be equipped with both the single and multiple-operator type machines. A suitable layout for a school is shown in the accompanying sketches, Figs. 1 and 2.

Without the proper materials a satisfactory product cannot be built; likewise without the proper men expert welders cannot be produced. It is very important, therefore, that men be selected for this training who have the right physical make-up, who have had the proper background for welding and who are honest and conscientious in their work.

Previous Mechanical Training Desirable

From experience it has been found that the man with mechanical training usually develops into the best welding operator on general manufacturing work. By this training, the man has learned to concentrate and has acquired the knack of coordinating the eyes with the muscles of the hands and arms, which is very important in welding. In selecting men to be trained in welding, it is best to pick men who have had previous experience in the particular line of work that you wish them to do welding on; that is, if you want welders for building construction, select men who have had experience in steel construction. Likewise if you want men to weld boilers, select experienced boiler-makers. This applies to all lines of welding, but where it is not possible to get men with the proper experience,

at least pick those having mechanical or metal-working experience.

After a man has completed the school course and has passed the tests he may be considered a welder, but to be rated a first class welder he should measure up to certain standards. In our opinion the following specifications given cover very fairly what should be required of a first class welder:

- 1.—Six months or more metal-working experience previous to taking up welding.
- 2.—Physical fitness to do welding on the particular kind of work hired for.
- 3.—Inherent honesty and pride in workmanship.
- 4.—Some knowledge of the heat treatment, uses and properties of steel.
- 5.—Thorough knowledge of welding equipment in general.
- 6.—Understanding of the fundamentals of electricity as it applies to welding.
- 6.—Welds showing average tensile strength of 50,000 lb. per sq. in., and a minimum of 45,000 lb. per sq. in. for five American Welding Society qualification tests. This includes both arc and gas welding.
- 8.—Familiarity with the various grades of welding wire and their manipulations and uses.

The man will have to give some of his time to the study of books dealing with welding and chemistry and materials of construction.

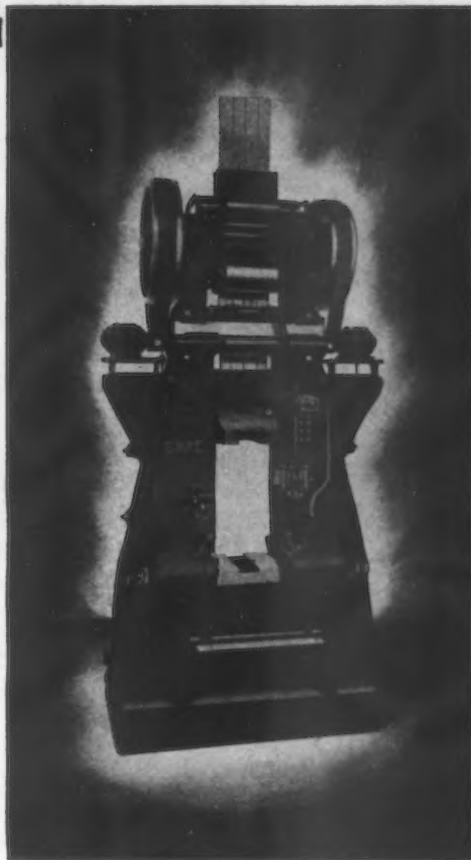
Horseshoe Imports Endangering Code

WASHINGTON, Dec. 3.—Imports of horseshoes and muleshoes made of steel and wrought iron, from Germany and the Netherlands, are increasing to a point at which they threaten to render ineffective the code for the horseshoe and allied products manufacturing industry, according to a complaint filed with NRA.

Firms joining in the complaint are the Phoenix Mfg. Co., Joliet, Ill., and Catasauqua, Pa.; the Tredegar Co., Richmond, Va.; the Burden Iron Co., Troy, N. Y., and the Wareham Mfg. Co., Wareham, Mass. These firms represent the entire domestic production of horseshoes, an NRA statement said. The complaint alleges that the imports are of substantially the same grades as domestic horseshoes and are selling for \$1 and \$2 per 100-lb. keg less than corresponding types manufactured in the United States.

Upon advice of the National Industrial Recovery Board, the President may order an investigation by the

PRODUCTION OR DISTRIBUTION?



An economist recently said that the major problem of industry is no longer production, but rather it is distribution.

Perhaps you feel as we do that production is still a major problem owing to such factors as shortened work hours, higher wages, rising costs, unpopularity of overtime work—coming at a time when profits and purchasing power are not what they should be.

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Tariff Commission of complaints that imports in increasing quantities are endangering the operation of any code. After investigation by the commission, the President may increase duties as much as 50 per cent in order to protect code operation.

Inland Steel Books 21,000 Tons of Piling

WASHINGTON, Dec. 4.—The Inland Steel Co., Chicago, has been awarded a contract for 21,000 tons of

steel sheet piling for the Columbia basing project of the Grand Coulee Dam by the Bureau of Reclamation, Department of Interior. The award was made by lot, drawing the name of the successful bidder having been done after it was discovered that all five makers submitted identical figures at 2.60c. base, Seattle, Wash. The contracts totaled \$1,180,401.40, delivered, Odair, Wash. The piling will be rolled at Indiana Harbor, Ind., and shipments are to begin at once. This was the largest steel tonnage let by lot since the NRA code went into effect.

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Send for circular of our new machine with tilting table.

DAVIS KEYSEATER COMPANY

400 Exchange Street

ROCHESTER, NEW YORK

Demountable Steel Containers Transferred from Freight Car to Truck

(Continued from Page 47)

roads contributing to the Cincinnati Terminal to supply, under tonnage contracts, chain hoists, bodies and motor equipment, sufficient to handle 1200 tons of run of car freight daily. The carriers were to equip their stations with craneways, at their own expense. Later the engineering committee of the carriers requested electrification of the hoists. When this request was made, many of the craneways were completed and material was on hand for the balance. Such craneways had underslung rails on 12-ft. centers, designed to accommodate conventional chain hoists. It was difficult to change craneways at this stage of installation, but 16 electric lift hoists were ordered from a chain block manufacturer which are still working satisfactorily on short craneways.

These hoists were not entirely suitable, however, because they could not be equipped for electric travel, and a new type of crane was designed, 50 of which were built and erected within 60 days. These cranes are still functioning successfully after about 15 years of service and have required minimum maintenance expense. However, the average cost of the 66 cranes and electric hoists installed at this time was \$3,500, which was believed to be too high. A screw

lift bridge crane was then developed to meet minimum clearance demands, which would cost only \$1,800. Although it proved successful on new standard craneways, it was not applicable to existing craneways at Cincinnati.

Cheaper Units Designed

Extension of facilities at Cincinnati required additional cranes and the Motor Terminals Co. has designed and is building for its subsidiary, the Cincinnati Motor Terminals Co., new type cranes, the assembly cost of which completed units will be approximately \$1,500, as compared with \$3,500, previously charged by manufacturers.

Through the simple procedure of bolting drums to wheel hub flanges of worm drive heavy-duty truck axles, such units, together with stock gear reduction motors, will be assembled in light and inexpensive structural steel frames for underslung suspension on Cincinnati craneways as previously described. The exclusive employment of standardized parts, the combination of which fortunately offers desired gear ratio reductions, makes possible time-tested reliable mechanical units at but a fraction of the cost of special units previously purchased.

Pendant from such axle cranes or hoists is a motor operated cradle for attachment and detachment of cradle shackles to and from body hooks. Built into the cradle are suitable guides for quickly aligning shackles and hooks, thereby minimizing maneuvering time losses of either crane or truck for alinement of cradle with body.

Push Button Control

All crane movements, such as lifting, trolleying, weaving and cradle attachment, are controlled from push buttons in an assembly pendant from crane in most convenient location as recommended at each point of installation.

Craneways, standardized with exception of foundation footings, are obtainable at a cost of approximately \$12.50 per lineal foot. Estimating 10 ft. as length of craneway per body location it is thus apparent the craneway expense per body setting on platform is only \$125. An axle crane can easily serve a battery of ten or more bodies at any craneway location, and thus the expense of craneway and crane per body setting does not exceed \$275.

During the loading and unloading period, bodies, either on rail car, truck or semi-trailer, are immobile. When not mobile the company classifies them as "sorting bins" for segregation of merchandise freight into its classification routings. Thus capital expense demands are less for handling machinery at \$275 per body unit than \$1,200 to \$1,500 per trailer unit during such immobile parking of bodies.

Another advantage is reduction in maintenance, as well as amortization of one comparatively slow moving crane unit, versus ten or more semi-trailer units, the latter subject to intermittent high-speed transit demands. In addition, the inevitable costly deterioration of rubber tires on semi-trailers is eliminated when bodies are transferred by crane from automotive vehicle to platform or flat car. The automobile vehicle is also kept constantly running in productive transportation, thereby working out mileage equity in tires before age deterioration thereof.

For some buildings or loading platforms with limited clearances between platform and ceiling or with an outside platform covered by a marquee of little height above road, a roadway surface hydraulic mechanism has been devised. It consists of four H-beams set vertically in concrete foundations located in roadway or in a pit cut back into the platform, on 10 x 14 ft. centers. Between such H-beams, fore and aft, concrete wheel guides can be

poured, thereby forming a truck runway wide enough to permit the convenient backing in of vehicles not exceeding the legal width limitation of 8 ft.

Set into the inner surface or pockets of each of these four vertical H-beams are four hydraulic cylinders, the piston rods of which extend through the upper end of cylinder. To each of such piston rods is attached, at its inner end, a collapsible bracket, the brace of which rises and falls on ball bearings seated in two channels attached inside of the flanges of each H-beam.

In operation a truck backing into one of these runways will suffer no interference from the lifting brackets, inasmuch as they will all be in collapsed position. When the vehicle is stopped at its location with rear end adjacent platform, the master pump throwing fluid to these cylinders, driven by an electric motor, can be started by driver from a switch at cab end of vehicle or by platform labor from a switch at rear end of vehicle on platform or selectively by either, as two switch controls can be installed in each runway.

Handling Equipment for All Locations

Many other plans have been developed for the handling of containers under various conditions. In all cases utilization of existing facilities is the first consideration. It is realized that a high investment in cranes and runways reduces the economies derived from such movement of freight, and that neither railroads nor shippers can afford to make tremendous equipment outlays at this time, which would require long periods for liquidation.


While the overhead crane method of transferring demountable containers from place to place is especially well adapted to the frequent movement of large numbers of containers, and transfer by lift trucks is particularly desirable in cases where freight is subject to storage in containers, the practice of providing each container with its own castors has many desirable attributes. As developed by Roloff, Inc., Kendall Square Station, Boston, this method of movement is believed by its sponsors to be capable of universal use for all container handlings, and units so equipped are designated as "Freightainers."

The system is rather widely used in New York and New England by such shippers as First National Stores, Inc., and the Manhattan Storage & Warehouse Co. and a number of carriers including the New York, New Haven & Hartford Railroad and the American Railway Express Co.

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Various types of bodies, both closed and open, are provided in a number of different sizes, but the method of transfer is probably of most interest.

Castors for this purpose must be of very special heavy-duty locking swivel design, and are manufactured only by the Roloff organization. Four or more castors, according to the length of the container, are attached to the bottom of the unit to be moved. Levers along the bottom edges of the container make it possible to lock the individual castors against swiveling. Whenever the container is to be pushed or pulled by either man or mechanical power, the two castors farthest from the point of application of the power are locked against swiveling, in a direction parallel to the desired direction of motion, and all the other castors are unlocked and left free to swivel in any direction.

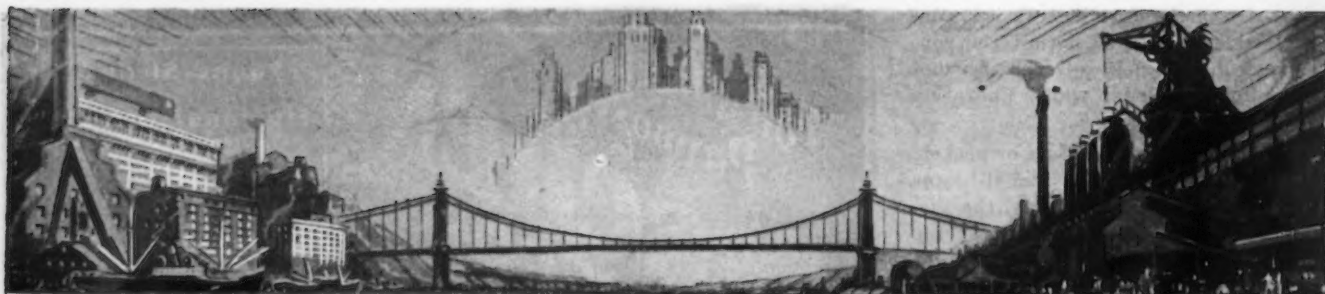
This, in effect, makes the container a four-wheeled trailer having two rigid wheels and two castors. By using the proper couplings, a whole train of containers so equipped may be towed by a tractor around corners or posts in a warehouse or freight station. Many times, it may be necessary to separate one or more containers out of a train and this can be done easily by unlocking all the swivels and pulling the unit out sidewise. There are so many other situations where it is convenient to have all the castors swivel that really efficient live skid or trailer operation is impossible without this locking swivel feature.

The Roloff method requires special

equipment on the chassis of motor trucks to carry the "Freightainers." The equipment consists of tracks, locking devices and leveling devices which can be attached to any chassis. The required equipment, however, costs less than any body that could be put on the chassis, and has the added advantage that any type of truck body can be rolled on to the same tracks, so the truck can be used for any desired purpose while it is not carrying containers. If desired, cross tracks can also be provided on the chassis, so the truck can drive alongside a flat car spotted on team tracks to transfer a whole truck body from truck to car.

The same types of tracks and locking equipment used on truck chassis are also used on the flat car and the spacing of the tracks can be arranged to accommodate any size of container on the same car. The cost of this equipment is less than the cost of special built gondola cars used with the lift truck or overhead crane methods in some instances, although it is open to the same objection that the cars cannot very well be used for other kinds of freight after they have been equipped for containers.

Nevertheless, containers small enough to go through the doors of box cars can be carried in box cars without auxiliary equipment. "Freightainers" are equipped with lifting rings and the wheels can be spaced so that lift trucks can run under them from either the sides or the ends, thus making them capable of handling by whatever method is in use at any terminal.



PLANT EXPANSION AND EQUIPMENT BUYING

Machine Tool Activity Approaching Year-End Slump—Sales Very Light

DECEMBER is apparently bringing curtailment in such activity as had heretofore existed in the machine tool market. Much of the inquiry before the trade is not now expected to be acted upon before the first of the year, but builders of machinery are very hopeful regarding first quarter business.

No important buying has been reported in the Detroit area in the last week and the Army Ordnance Department is slow to act against its large machine tool inquiries. All bids will be in this week and action is expected soon on the tenders which were taken two or three weeks ago.

Foreign demand is holding its own and better inquiry has developed from southern European countries. Sales generally are featured by lighter tools, particularly grinders and milling machines.

◀ NORTH ATLANTIC ▶

Colonial Beacon Oil Co., Inc., 155 East Forty-fourth Street, New York, has plans for new bulk oil storage and distributing plant at Patchogue, L. I. Cost about \$50,000 with steel tanks, pumping machinery and other equipment. C. T. Paul is company engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 11 for 60 universal dial-type test indicators (Schedule 3812) for Brooklyn and Mare Island Navy yards; automatic echo sounding equipment (Schedule 3834) for Brooklyn and Philadelphia yards; sharpening stones (Schedule 3776) for Brooklyn yard; 60 steam-jacketed kettles (Schedule 3822) for Brooklyn, Boston, Norfolk, Mare Island, Puget Sound and other yards.

Cidega Machine Shop, Inc., New York, has been organized by Bruno Deri, 1626 Lexington Avenue, and Joseph Ciotta, 218 East 122nd Street, to operate a general machine and repair works.

American Distilling Co., 135 East Forty-second Street, New York, affiliated with American Commercial Alcohol Corp., 405 Lexington Avenue, has leased four-story factory at Hoboken, N. J., about 80,000 sq. ft. floor space, for new plant. Factory is now occupied by Elevator Supplies Co., and its subsidiary, National Pneumatic Co., which will remove to new location.

Commissioner of Accounts, Saratoga Springs, N. Y., asks bids until Dec. 14 for new pumping station and filtration plant for municipal water system, including high and low-lift and auxiliary pumping machinery, operating tables, chemical feed machinery, filter equipment, valves, piping, etc. Nicholas S. Hill, Jr., 112 East Nineteenth Street, New York, is consulting engineer.

Highway Trailer Co., 32-01 Queens Boulevard, Long Island City, manufacturer of motor trucks, trailers, parts, etc., with main plant at Edgerton, Wis., has leased one-story building at 37-15 Thirty-fifth Street, for new factory branch, service and repair works.

Board of Education, Park Avenue and Fifty-ninth Street, New York, plans vocational training department in new multi-story junior high school in Williamsburg district, Brook-

lyn. Cost about \$1,500,000. Fund is being arranged through Federal aid. W. C. Martin, Flatbush Avenue Extension and Concord Street, Brooklyn, is architect.

Anheuser-Busch, Inc., 515 West Sixteenth Street, New York, brewer, with main plant at St. Louis, has leased site at Thirty-third Street and Twelfth Avenue and has taken out building permit for new two-story factory branch, storage and distributing plant, including garage and repair division for company motor trucks. Cost close to \$100,000 with equipment.

Romeo Malatesta, 533 West Broadway, New York, wines and liquors, plans new winery and distilling plant near Sanger, Fresno County, Cal., with storage and distributing buildings. Cost close to \$50,000 with equipment.

General Equipment & Machine Co., Jersey City, N. J., has been organized by John J. Babe and Douglass Johnston, 154 Golden Street, to manufacture machinery and other mechanical equipment.

State Purchase Commissioner, State House, Trenton, N. J., asks bids until Dec. 10 for scraper blade edges for highway service.

Board of Education, Bridgewater, N. J., plans manual training department in new multi-story school. Cost \$245,000 with equipment. Fund has been arranged through Federal aid, and bids will be asked soon on general contract. Campbell Voorhees, 16 Schuyler Place, Morristown, N. J., is architect.

National Bearing Metals Corp., 364-76 Ninth Street, Jersey City, N. J., manufacturer of bearing and other special metals, has purchased two-story building, 100 x 150 ft., at 255-67 Brunswick Street for expansion.

Gottfried Kruger Brewing Co., 75 Belmont Avenue, Newark, N. J., has plans for extensions and improvements, including new equipment. Cost over \$150,000 with machinery. Waldemar Mortensen, 103 Park Avenue, New York, is architect and engineer.

Commanding Officer, Frankford Arsenal, Philadelphia, asks bids until Dec. 17 for 12 2½-kva., gasoline-electric generating units, with alternate bids on 21 such units (Circular 173).

Blue Ridge Co., Inc., recently organized by Abraham T. Eastwick, president, James Lees

& Sons Co., Bridgeport, Pa., manufacturer of woolen goods, and associates, with capital of \$1,000,000, to erect new woolen mill on 75-acre tract on James River, Glasgow, Va., has plans for initial one-story units, totaling 80,000 sq. ft. floor space. Power house and machine shop will also be built. Cost over \$250,000 with machinery. Ballinger Co., 105 South Twelfth Street, Philadelphia, is architect and engineer.

◀ WESTERN PENNA. ▶

Shin Devices Corp., Butler, Pa., recently organized by Byron H. Shin, Butler, to manufacture airplane wheels, aeronautical devices and equipment, has taken over property at Butler-Pittsburgh airport for new plant, comprising foundry and machine shop, and will soon begin operations.

Board of Trustees, Corry General Hospital, Corry, Pa., plans extensions and improvements in power house, including new boilers, stokers and other mechanical equipment. Cost over \$35,000 with equipment. Mayer & Valentine, Plymouth Building, Cleveland, are consulting engineers.

Pittsburgh Coal Co., Oliver Building, Pittsburgh, has acquired seven-acre tract near northern terminus of Youngstown & Suburban Railway, Youngstown, Ohio, as site for new coal storage and distribution terminal, to include trestle, loading machinery and other equipment. Cost over \$75,000.

◀ BUFFALO DISTRICT ▶

Franklin Motors, Inc., Syracuse, N. Y., has been organized to take over plant and property of H. H. Franklin Mfg. Co., 302 South Geddes Street, manufacturer of automobiles, in receivership since last April and inactive since that time. New company will make improvements in plant and equipment and will resume operations for production of new air-cooled automobile, including parts manufacture. John E. Williams, Syracuse, sales manager of former Franklin company, is president of new organization; George E. Ritter, Toledo, Ohio, is secretary and treasurer.

Canastota Mfg. Co., Inc., Canastota, N. Y., has been organized by William J. Doring, 186 Edgehill Road, Syracuse, N. Y., and associates, capital \$70,000, to manufacture iron and other metal castings, tools and mechanical specialties.

Red Lake Gold Shore Mines, Ltd., care of R. H. Templeton, Federal Building, Buffalo, representative, plans early development of gold-mining properties in Ontario, Canada, and will purchase mining, hoisting, conveying, loading and other mechanical equipment. Cost over \$75,000 with machinery.

◀ OHIO AND INDIANA ▶

Johnson Steel & Wire Co., Inc., Worcester, Mass., manufacturer of steel wire and allied products, has acquired property at Cuyahoga Falls, Ohio, for new branch plant, for which plans will be completed at once. Cost about \$40,000 with equipment.

International Harvester Co. of America, Inc., 606 South Michigan Avenue, Chicago, has let general contract to A. G. Samuelson, 316 South Clairmont Avenue, Springfield, Ohio, for one-story addition to motor truck and parts manufacturing plant, Springfield, 65 x 400 ft. Cost over \$100,000 with equip-

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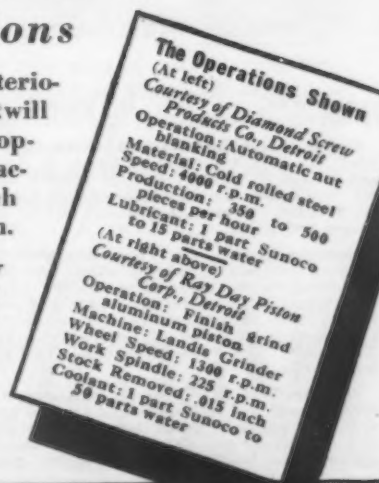
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typifies its fine machining quality in fabricating this threaded connector at 150 pieces per hour versus 103 for the former stock. Tool life doubled by using Ultra-Cut on this job.

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ment. Other new units are planned next spring.

Sumit Calculating Machine Corp., Cleveland, has been organized by Elmer C. Franz and Joseph G. Takash, care of Samuel Racz, 625 Williamson Building, representative, capital \$300,000, to manufacture calculating machines and parts.

Gummed Products Co., Troy, Ohio, manufacturer of gummed paper specialties, has plans for one-story addition, about 50,000 sq. ft. floor space, including improvements in present factory and installation of new machinery. Cost close to \$200,000 with equipment. John H. Deeken, Times-Star Building, Cincinnati, is architect.

Leetonia Tool Co., Leetonia, Ohio, manufacturer of coal and rock drills and kindred products, has approved plans for one-story addition for storage and distribution, and remodeling existing building for new power plant.

Cost over \$70,000 with equipment. C. E. Holt is general manager.

Material Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until Dec. 10 for 300 gasoline fire pots, with pump, etc. (Circular 333), target assemblies (Circular 254), altimeter assemblies (Circular 310); until Feb. 14, 1935, three autogiro aircrafts (Circular 183).

Village Council, Middle Point, Ohio, plans installation of pumping machinery and accessory equipment, 100,000-gal. steel tank on 100-ft. tower, pipe lines, etc., for municipal water system. Fund of \$36,000 has been arranged. C. J. Simon, Van Wert, Ohio, is consulting engineer.

Ace Mfg. Co., Inc., 560 Elder Avenue, Indianapolis, has been organized by Carl F. Millican and Grover Burkholder, to manufacture machinery and parts, and other mechanical equipment.

Abbatoir Packing Co., 1220 Drover Street, Indianapolis, meat packer, has plans for extensions and improvements, including equipment. Cost close to \$30,000 with equipment.

◀ SOUTH CENTRAL ▶

Cummins Distillery Corp., Athertonville, Ky., has approved plans for new power house at distillery. Cost about \$30,000 with boilers, stokers and other equipment. Company has work under way on extensions and improvements in main plant. Cost close to \$200,000 with machinery. Walter C. Wagner, Breslin Building, Louisville, is architect and engineer.

Campbellsville Cooperage Co., Campbellsville, Ky., plans one-story addition for manufacture of wire-bound kegs, barrels, etc.; work to begin soon after first of year. Cost about \$35,000 with machinery.

United States Engineer Office, Louisville, asks bids until Dec. 11 for two 750-hp. propelling engines, one 1600-hp. dredge pump engine, and one 575-kw. generating set, all Diesel type.

Quachita Parish Gravity Drainage District No. 1, West Monroe, La., Samuel H. Humphries, secretary, will soon take bids for pumping machinery and auxiliary equipment, pipe lines, etc., for new water supply and drainage project. Cost about \$75,000. Fund has been arranged.

Reynolds Metals Co., Louisville, manufacturer of aluminum, lead and other metal foils, metal-surfaced papers, etc., will carry out expansion in local plant, including installation of equipment. Headquarters are at 19 Rector Street, New York.

◀ NEW ENGLAND ▶

Torrington Electric Light Co., Torrington, Conn., has let general contract to Torrington Building Co., Torrington, for one-story power plant addition, 25 x 100 ft. Cost about \$40,000 with equipment.

Construction Service, Veterans' Administration, Arlington Building, Washington, asks bids until Jan. 3 for buildings and utilities for institution at Togus, Me., including ice-making and refrigeration plant, electrical equipment, outside distribution systems for electric power, water and other utilities; steel stairs, steel shelving and cabinets, hardware, electric elevators and other equipment. Entire project will cost about \$1,000,000.

Wyoming Valley Paper Mill, Northumberland, N. H., plans rebuilding part of pulp mill recently destroyed by fire. Loss over \$60,000 with equipment.

Haverhill Electro Plating Corp., Haverhill, Mass., has been organized by Leander G. Yeaton, 19 Hale Street, and associates, to operate a general metal plating works.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 11 for shovels and scoops for Boston, Portsmouth, Philadelphia, Mare Island and other navy yards (Schedule 3818).

State Department of Correction, State House, Boston, has let general contract to M. Spinelli & Sons, 38 Chauncy Street, for two new industrial buildings, known as A and D, at State Prison Colony, Norfolk, Mass. Fund of \$391,745 has been advanced through Federal aid for buildings and equipment. McLaughlin & Burr, 88 Tremont Street, Boston, are architects.

P. & W. Mfg. Co., New Haven, Conn., has been organized by Abraham and Samuel Par-doll, 113 Camel Street, to manufacture water heaters and parts.

◀ SOUTH ATLANTIC ▶

Carolina Pyrophyllite Co., Wilmington, N. C., recently organized, care of Broadfoot Iron Works, Inc., foot of Church Street, Wilmington, plans development of pyrophyllite properties, a crystalline raw material, near Greensboro, N. C., and will purchase pulverizing, grinding, screening, conveying, elevating, air separating, loading and other equipment. Plans are under way for one-story mill. Broadfoot company is engineer for project and will make machinery purchases.

International Harvester Co., 578-90 Withall Street, Atlanta, Ga., with headquarters at Chicago, will soon take bids on general contract for addition and improvements to local branch plant. Cost about \$50,000 with equipment. Mercer Lee is Atlanta manager.



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5071

Coca-Cola Co., 310 North Avenue, N.W., Atlanta, Ga., manufacturer of beverages, has plans for one-story factory branch, bottling works, storage and distributing plant adjoining present plant at Baltimore. Cost over \$120,000 with equipment. H. F. Wilds, first address noted, is company engineer; Robert & Co., Bona Allen Building, Atlanta, are consulting engineers.

City Council, Franklin, N. C., plans installation of pumping machinery and accessory equipment, pipe lines, etc., for extensions and improvements in municipal waterworks. Fund of \$122,000 has been arranged through Federal aid. Harwood Beebe Co., Spartanburg, S. C., is consulting engineer.

◀ SOUTHWEST ▶

Liquid Carbonic Co., 2000 Baltimore Avenue, Kansas City, Mo., has authorized plans for

two, three and four-story and basement dry ice-manufacturing plant. Cost over \$200,000 with machinery, instead of smaller sum previously noted. Frank C. Becker is local manager.

United States Engineer Office, Missouri River Division, Postal Telegraph Building, Kansas City, Mo., asks bids until Dec. 12 for portable cable terminal structures for dredges at Fort Peck, Mont., project.

Missouri Pacific Railroad Co., Missouri Pacific Building, St. Louis, plans extensions in system of Lower Rio Grande Railroad, an affiliated interest, including track facilities, loading and other equipment. Fund of \$60,000 has been authorized.

City Council, Emporia, Kan., plans new pumping plant and pipe line for water supply from Cottonwood River. Equipment bids will be asked soon. Fred Humes is city engineer.

Southwest Grease & Oil Co., 225-27 North Waterman Street, Wichita, Kan., plans two-story addition, 50 x 58 ft., to bulk oil storage and distributing plant.

Black Servant Coal Stoker Co., St. Louis, has been organized by E. H. Dewes and C. B. Hill, to manufacture stokers and parts for domestic service. Company will take over Black Servant Mfg. Co., 2951 North Market Street.

Board of Education, Corpus Christi, Tex., plans manual training department in new junior high school, for which bids will be asked on general contract early in January. Cost over \$275,000. Griffith, Hamon & Levy, Inc., Sherman Building, is architect; Lloyd D. Royer, Smith-Young Tower, San Antonio, Tex., is mechanical engineer.

Texlite Co., Inc., 4112 Commerce Street, Dallas, Tex., manufacturer of enameled iron electric signs and displays, plans rebuilding factory recently destroyed by fire. Loss over \$65,000 with equipment. T. W. Harvey is head.

City Council, Kerrville, Tex., asks bids, closing about Dec. 15, for addition to municipal butane-air gas plant and improvements in present unit, with installation of new gas and air mixing machinery and other equipment, electric motors, controls, etc. A. P. Hancock, Kerrville, is engineer.

◀ MIDDLE WEST ▶

Westminster Brewing Co., 1460 South Union Street, Chicago, has asked bids on general contract for one-story mechanical bottling plant. Cost over \$25,000 with equipment. Richard Griesser & Son, 64 West Randolph Street, are architects.

Air Tempering Systems, Inc., 420 North La Salle Street, Chicago, has been organized by W. Proctor Roberts and J. Grant Fenn, to manufacture heating and air-conditioning equipment and parts.

Southeast Nebraska Power District, Beatrice, Neb., J. Edward Fisher, Beatrice, secretary, will soon ask bids on electrical distribution system in rural districts in southeastern part of State, about 600 miles. Fund of \$575,000 has been secured through Federal aid. Lawrence C. Black is engineer.

State Commission of Administration and Finance, State Capitol, St. Paul, Minn., will soon begin erection of one-story foundry, 28 x 180 ft., at State Prison, Stillwater, Minn., for which general contract recently was let to Lindstrom & Anderson, St. Paul. Cost about \$35,000 with equipment. Charles A. Hausler, Minnesota Building, St. Paul, is architect.

Virginia City Mining Co., Virginia City, Mont., F. R. Scott, Fargo, N. D., president and manager, plans development of local gold-mining properties, with installation of mining machinery, power, conveying, hoisting, loading and other mechanical equipment. Cost over \$100,000 with machinery.

◀ WASHINGTON DISTRICT ▶

Balmar Corp., Clipper Road, Woodberry, Baltimore, manufacturer of metal products, has let general contract to Carlstrand Engineering Co., 10 West Chase Street, for two-story addition, 30 x 205 ft., for storage and distribution. Cost about \$40,000 with equipment.

Quartermaster, Marine Corps, Washington, asks bids until Dec. 10 for eye bolts, clamp bushings, flexible steel armored conduit, zinc alloy couplings, drill points, conduit elbows, steel wing anchors, lightning arresters, pipe clamps, strain insulators, copper wire, toggle bolts, cable, bushings and other supplies (Schedule 313).

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until Dec. 14 for 90 1-ton trailers (Circular 79); until Dec. 17, 1550 fire extinguishers, different types (Circular 78).

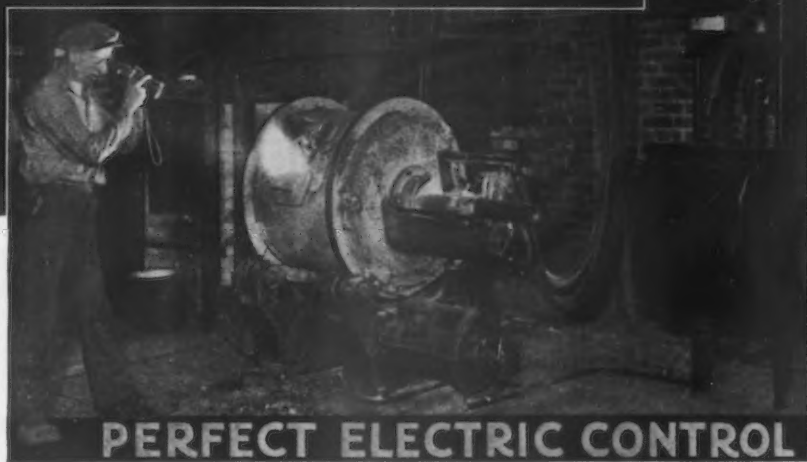
Goodyear Tire & Rubber Co., East Market Street, Akron, Ohio, has let general contract to W. E. Bickerton Construction Co., 515 Cathedral Street, Baltimore, for two-story factory branch, storage and distributing plant at Baltimore. Cost over \$100,000 with equipment. Wilbur Watson & Associates, 4614 Prospect Avenue, Cleveland, are architects and engineers.

Thomas Ward Distilling Co., Finksburg, Md., near Baltimore, has plans for five-story addition, 70 x 85 ft., for storage and distribution. Cost about \$45,000 with equipment.

THE PERFECT ANODE



AND THE REASON



PERFECT ELECTRIC CONTROL

HAVE you ever wondered why some anodes corrode smoothly and evenly to a mere "stiletto," while others honeycomb apart long before they are used up? The answer is — **GRAIN STRUCTURE!** Specimen "A", below, has a fine, even grain with no porosity to admit acid between crystals. The corrosion was entirely on the surface—hence its evenness. In specimen "B", the crystals were separated by impurities which, under electrolytic action, dropped to the bottom of the tank and formed sludge (waste)! If action had been continued a little longer, the undermining would have met itself and severed the anode.

Seymour Nickel Anodes give 100% deposit because the grain structure is homogeneous. Nothing is used but virgin nickel. This is melted in a modern, electric furnace and poured under accurate pyrometric control —

after which the mix is tested in the laboratory for crystallization. Every anode has a fine grain structure of correct analysis and will stay on the hook until complete corrosion has taken place.

Seymour Nickel Anodes (sand cast, iron mold or rolled depolarized) are made in 90-92%, 95-97% and 99 + carbon type, and in 99 + oxide type, in over 250 patterns. Your preference is always available in Seymour "Controlled Grain" Anodes. If you think you are not obtaining full service from your anodes, send us one for free metallurgical and physical examination. (Seymour Anode Book on request.)



A

DO YOUR ANODES WEAR LIKE THIS?



B

OR THIS?

THE SEYMOUR MANUFACTURING CO., 24 FRANKLIN ST., SEYMOUR, CONN.

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CONTROLLED GRAIN

NICKEL ANODES

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Pedigreed Forgings

It, too, must have blood lines. These are not only the good name, skill and workmanship of the forge shop, but equally important, the forging billet which is converted into the finished forging. • When you use ASCO Special High Grade Forging Billets and Slabs you are sure of the pedigree of your forgings—there need be no doubt in your mind as to quality and performance—these characteristics are unmistakably present in every ASCO billet.



Our Metallurgical Laboratories are at your service in developing special steels for special purposes.

ASCO FORGING BILLETS

THE ANDREWS STEEL CO., NEWPORT, KENTUCKY

CARBON, CHROME, CHROME MOLYBDENUM, CHROME NICKEL, CHROME VANADIUM, MOLYBDENUM, NICKEL, NICKEL MOLYBDENUM, VANADIUM BILLETS AND SLABS

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 11 for ratchet braces and breast drills (Schedule 3813), chisels, chisel blanks and bars (Schedule 3820), clamps and punches (Schedule 3821), portable electric drills and grinders (Schedule 3816), motor-driven air compressors and spare parts (Schedule 3824) for Eastern and Western Navy yards.

◀ PACIFIC COAST ▶

Halifax Explosives Co., 810 Wright & Calender Building, Los Angeles, Melville Dozier, Jr., president, has plans for new powder plant in Mint Canyon district, including machine shop and other mechanical units. Cost about \$100,000 with equipment.

Amalgamated Sugar Co., Ogden, Utah, H. A. Benning, vice-president, is asking bids for foundations and will soon take estimates for

superstructure for six buildings for new beet sugar mill on 75-acre tract recently acquired at Clarksburg, Cal. Work will include power house, machine shop and other mechanical units. Cost about \$1,000,000 with machinery. Company engineering department is in charge.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 11 for 22,200 ft. flame-proof cable (Schedule 3836) for Puget Sound Navy Yard.

Baker School District, Baker, Ore., plans manual training department in new two-story junior high school, for which bids will soon be asked on general contract. Cost about \$125,000. Wallace Landreth, Baker, and Lee Thomas, Weatherly Building, Portland, are architects.

Chambers Electric Brake Co., Los Angeles, has been organized by D. O. Chambers and F. C. Scott, care of S. F. Macfarlane, 357 South Hill Street, representative, to manufacture electric brakes and other mechanical equipment.

Los Angeles Water and Power Bureau, 207 South Broadway, Los Angeles, D. P. Nicklin, purchasing agent, asks bids until Dec. 10 for one motor-driven air compressor, 1170 cu. ft. air per min., stationary type (Specification 1555).

Soquel Union Grammar School District, Soquel, Santa Cruz County, Cal., has let general contract to P. T. Wallstrum, 854 Main Street, Watsonville, Cal., for one-story addition for manual training shop. W. W. Wurster, 260 California Street, San Francisco, is architect.

◀ MICHIGAN DISTRICT ▶

National Stamping Co., 630 St. Jean Street, Detroit, manufacturer of metal stampings, etc., has let general contract to W. J. C. Kaufmann Co., 10610 Shoemaker Street, for one-story addition. Cost about \$25,000 with equipment.

Murray Corp. of America, Inc., 1424 Aberie Street, Detroit, manufacturer of automobile bodies, will make extensions and improvement in plant and equipment primarily for production of bodies for Ford automobiles.

Wayne Packing Co., 1514 Adelaide Street, Detroit, meat packer, has let general contract to Fullerton Construction Co., 11733 Russell Street, for one-story addition. Cost close to \$30,000 with equipment.

F. L. Jacobs Co., 6901 East Lafayette Avenue, Detroit, manufacturer of metal tubing, has asked bids on general contract for one-story addition. Cost close to \$25,000 with equipment. Pollmar, Ropes & Lundy, 2539 Woodward Avenue, are architects.

Monopower Corp., 4475 Penobscot Building, Detroit, has been organized by Wallace & Co., same address, capital \$125,000 and 50,000 shares stock, no par value, to manufacture power equipment and parts.

◀ FOREIGN ▶

Siderurgica de Valdivia, Cia., Corral, Chile, manufacturer of iron and steel products, is planning additions to plant, including rolling mill and shops. Cost about \$2,000,000 with machinery, which will be permitted by Government to enter duty free from other countries. Financing has been arranged through Federal aid.

Secretary, Public Works Supply and Tenders Committee, Wellington, New Zealand, asks bids until Feb. 19, 1935, for steel structures and electrical equipment for Arapum Power Scheme, Henderson, New Zealand; until March 5, 1935, for seven 8000-kva. power transformers and spare parts.

Commissariat for Heavy Industry, Soviet Russian Government, Moscow, has begun erection of first units of new plant at Kiev, Russia, for manufacture of automatic machine tools, including parts and assembling divisions; plans for additional buildings to be erected during 1935 will soon be approved. Complete plant is scheduled for completion late in 1936, and will cost over \$3,000,000 with machinery. Amtorg Trading Corp., 261 Fifth Avenue, New York, is official buying agency.

Ohio River Shipments Of Steel Higher

MOVEMENT of iron and steel products on the Ohio River in the Pittsburgh district in October amounted to 46,475 net tons, compared with 45,848 tons in September, 45,840 tons in August, and 49,047 tons in October, 1933, according to the latest report of the United States Engineer Office, Pittsburgh. Total movements of steel products on the Monongahela River in October were 43,347 tons, compared with 35,411 tons in September, and 39,026 tons in October, 1933. Shipments of iron and steel on the Allegheny River last month totaled 3400 tons.

"Above the Hook"
problems are solved
by the correct combination of Osborn
Tramrail units.

ABOVE AND BELOW THE HOOK

"Below the Hook"
problems are solved
by the correct
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Grab equipment.

Heavy dies and die blocks, as illustrated, are handled at a saving that is more than justifying the cost of installation . . . There is a good reason for every Osborn Tramrail installation.

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VERSATILITY - FLEXIBILITY - CONTROL



200 ton Metal Forming Press, 24" dia. ram, 24" stroke, 49 1/4" x 80" platens.

Controlled pressure, closely adjusted to the job . . . variation of stroke and opening . . . a dwell at the end of the stroke . . . smooth, positive action under any load . . . absence of vibration, shock and noise . . . adaptability to any metal forming operation . . . are among the advantages of Farrel-Birmingham Electric-Oil-Hydraulic Presses.

They are self-contained, compact, individually-powered units, which can be operated singly or in groups of any number, located anywhere to meet production requirements.

They can be supplied for any specific purpose . . . any size . . . any capacity . . . any pressure . . . any combination of movement or speed.

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100 MAIN ST., ANSONIA, CONN.

Employment and Earnings Higher

A GENERAL improvement in employment, hours, and earnings from September to October, was indicated by the results of the regular monthly inquiries of the National Industrial Conference Board. The number of workers employed in 25 manufacturing industries was 1.5 per cent higher in October than in September. Employment in the textile industries was exceptionally low in September because of the textile strike. In October it increased approximately to the level of August. Employment in the automobile industry, on the other hand, decreased markedly from September to October. Total man-hours worked increased 3.5 per cent, and total payroll disbursements, 4.0 per cent.

Average hourly earnings advanced slightly, from 59.1c. to 59.3c. An increase of 2.1 per cent in the average work-week, from 33.3 hr. to 34.0 hr. caused the weekly earnings to rise from \$19.53 to \$20.03 or 2.6 per cent. In addition, a slight decrease in the cost of living brought real weekly earnings to a level 2.8 per cent above that of September.

PERSONALS

L. D. O'CONNELL, formerly industrial division manager for the Westinghouse Electric & Mfg. Co., St. Louis office, has been appointed manager of air conditioning. In his new position he will supervise sales, engineering and manufacturing activities of all air conditioning apparatus.



ARTHUR E. BRAUN has been elected a director of the Allegheny Steel Co., Brackenridge, Pa., to fill the vacancy caused by the death of R. D. Campbell.



DAVID M. CURRY, for 11 years assistant superintendent of foundry departments in the Ford Motor Co., has been added to the development and research staff of the International Nickel Co., Inc., New York. After his association with the Ford company he was identified for a time with the Federal Mogul Corp., Detroit, in charge of all foundry activities, and in recent years has carried on an extensive consulting practice in the Middle West. Mr. Curry will make his headquarters in New York and will devote his time to development work in the non-ferrous casting field.



HARRY M. GREEN, hertofore San Francisco manager of mechanical goods sales for the United States Rubber Products, Inc., New York, has been appointed Pacific Coast division



L. D. O'CONNELL

manager of mechanical goods sales and will continue as manager of the San Francisco branch. In his new position, Mr. Green will coordinate his activities with those of J. B. Brady, general manager of the Pacific Coast division, with headquarters in San Francisco.



HARRY A. MEYERS, formerly vice-president of the Dean Machinery Co., Chicago, has been elected president, succeeding R. S. DEAN, who left the company several months ago. HARRY A. LYON has been elected vice-president.

The Edward G. Budd Mfg. Co., Philadelphia, in the first nine months of 1934, had a net loss of \$87,282, compared with a loss of \$253,252 in the first nine months of 1933. The company had a net loss for the third quarter of 1934 after deducting all charges, including depreciation, interest and taxes, of \$152,048. This compares with a profit of \$80,223 in the second quarter of 1934 and a profit of \$50,297 in the third quarter of 1933.

OBITUARY

CHARLES O. BARTLETT, who 50 years ago founded the C. O. Bartlett & Snow Co., Cleveland, manufacturer of foundry conveying equipment and other machinery, died Nov. 28 at his home in Brecksville, Cleveland suburb. He had not been actively associated with the company for several years.



COL. GEORGE WATSON FRENCH, founder of the extensive wheel industries of the Tri-Cities, president of French & Hecht, Inc., metal wheels, Davenport, Iowa, and one of the outstanding industrial figures in the State, died of heart disease, Nov. 27, aged 76 years.



HENRY H. MARTIN, 81 years old, president of the New Albany Machine Mfg. Co., Louisville, Ky., died of heart disease on Nov. 12 at his home in that city.



When John A. Roeblings Sons, Trenton, New Jersey, desired a most accurate, convenient, versatile Testing Machine for their Research Laboratory, it was only natural that they should turn to the Southwark-Emery. With four indicating dials, the high dial being 20,000 lb. and the low 1,500 lb. (reading to 2 lbs. per division), this Southwark-Emery Machine is a fit tool for the laboratory insisting on the highest standards.

The Southwark-Emery Testing Machine is rap-

idly becoming the standard of the Research Laboratories of this country. No less is it preferred for the severe demands of routine testing in many branches of Industry.

Ask us for a solution of your problem of materials testing.

Descriptive literature on the wide and varied line of Southwark-Emery Machines will be sent on request.

BALDWIN-SOUTHWARK CORP.
SOUTHWARK DIVISION PHILADELPHIA

Pacific Coast Representatives: The Pelton Water Wheel Co., San Francisco





LUMP ORE FOR OPEN HEARTHS IRON ORE • PIG IRON • COAL COKE ALLOYS

THE CLEVELAND-CLIFFS IRON CO., CLEVELAND O.

TRADE NOTES

Cadillac Machinery Co., Detroit, has been appointed representative for the **DeVlieg Milling Machine Co.**, Jackson, Mich., in the Detroit territory.

Ornamental Iron Works, Inc., Trenton, N. J., has removed its offices and factory from 45 Muirhead Avenue to larger quarters at 67 Bloomsbury Street.

Heine Boiler Co., St. Louis, in receivership since 1930, has been reorganized as a subsidiary of **Combustion Engineering Co., Inc.**, New York.

Production Machine Co., Greenfield, Mass., has purchased entire business, good-will, etc., of **Peerless Surfacing Machine Co., Inc.**, Troy, N. Y., and has moved business to Greenfield factory.

James G. Clark, Newark, N. J., manufacturer of heating and ventilating systems and sheet metal products, has moved from 164 Pennington Street to larger quarters at 33 Camp Street.

Hy-Grade Electro Plating Co., 35 Fourth Street, Newark, formerly **Hy-Grade Mfg. & Plating Co.**, will specialize in tin, chromium, nickel and cadmium plating. **G. Wagner** and **Joseph Maurer** are proprietors.

The Inland Steel Co., Chicago, and subsidiaries, had net loss of \$53,476 in the quarter ended Sept. 30, compared with a net profit of \$2,129,198 in the preceding quarter and with a profit of \$623,612 in the third quarter of 1933. Directors of the company have declared a dividend of 25c. a share on the capital stock payable Dec. 1 to stockholders of record Nov. 15.

Valley Steel & Supply Co., 1925 Broadway, Fresno, Cal., was recently organized as whole-

sale distributor of steel, heavy hardware and smithing coal. **F. E. Hollister**, formerly manager of **Inland Iron Co., Inc.**, Fresno, is owner and manager.

Non-Ferrous Foundry of True Alloys, Inc., 1820 Clay Avenue, Detroit, has been taken over by **J. P. Carritte** and **J. P. Carritte, Jr.**, former executives of **Detroit Aluminum & Brass Corp.** and will specialize on high-grade alloys of aluminum and bronze.

Oster-Williams, Cleveland, manufacturer of pipe and bolt threading equipment, has opened office and display room at 292 Lafayette Street, New York, in charge of **H. B. Van Osten**, district manager.

Caterpillar Tractor Co. had October net profit of \$266,498 from sales of \$1,767,850. In October, 1933, the company had a net loss of \$83,271. Net profit for the first ten months of this year was \$3,199,691 or \$1.70 a share on capital stock.

Granite City Steel Co. had net profit of \$155,931 in the nine months ended Sept. 30, compared with profit of \$233,611 for the corresponding period in 1933.

Wagner Electric Co., St. Louis, had a nine months' profit this year of \$275,000, compared with a deficit of \$66,349 for the 1933 period.

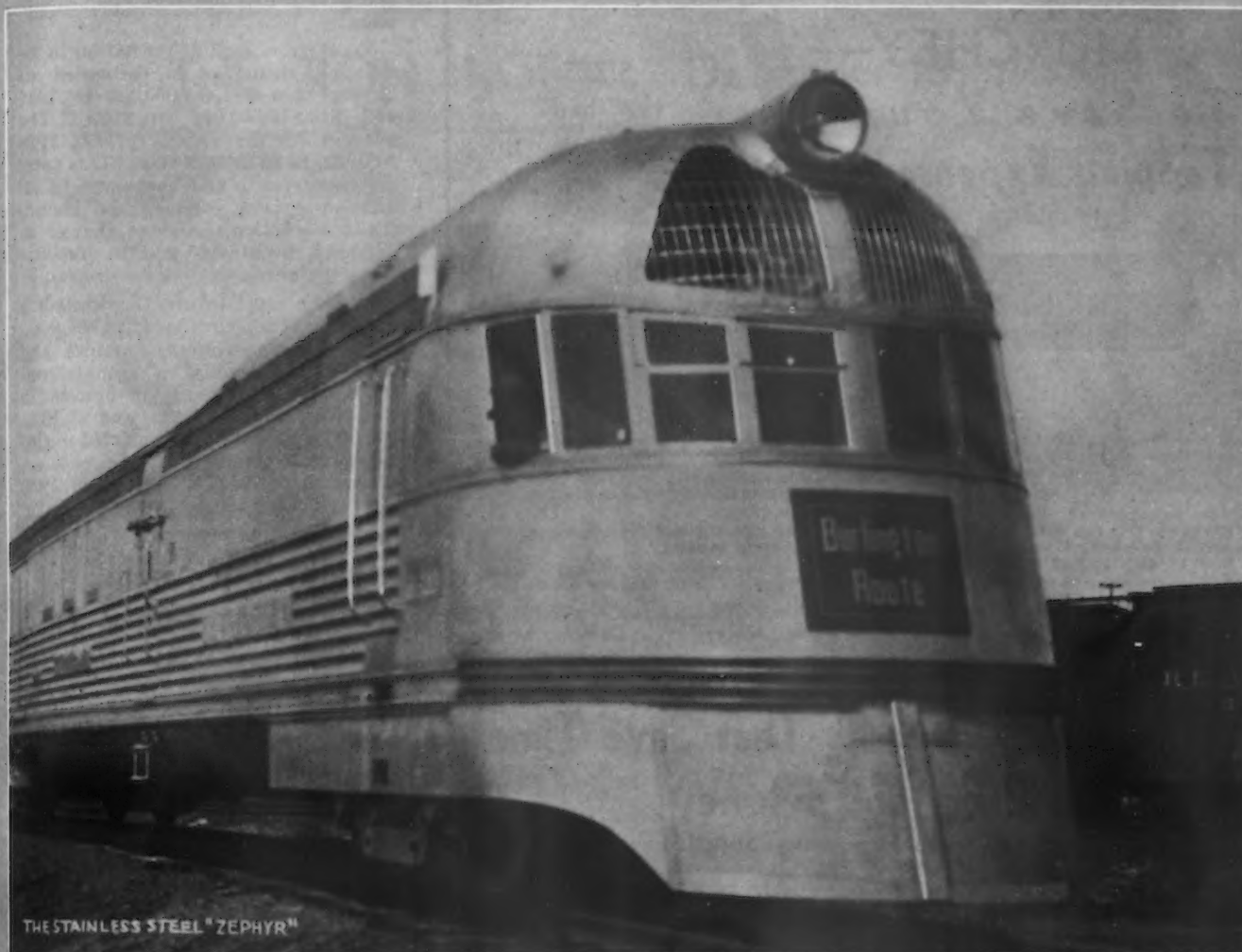
Trade Publications

Grinding Mills.—**Patterson Foundry & Machine Co.**, East Liverpool, Ohio. Catalog of 18 pages, describing and illustrating a line of ball, tube and rod mills for coarse and fine grinding in either wet or dry condition of various ores and many other raw materials and synthetic products. A jacketed mill in which water or steam is circulated permitting the grinding of materials in a heated condition at controlled temperature is also featured as well as automatic feeding devices and air separators.

Sheet Iron.—**Republic Steel Corp.**, Massillon, Ohio.—Bulletin 127, being fifth edition of 64-page booklet outlining in non-technical language production of iron sheets from ore mine to final finishing. Gage tables and glossary of metallurgical terms are included.

The recent construction of 152,000 metal cots for the United States Army by the **Bunting Glider Co.**, Philadelphia, required 76,000 ft. of welding. Indicating the size of this order, if these cots were stacked one on top of the other they would make a pile 29,000 ft. high, or if laid end to end they would extend from Cleveland to Buffalo. Blue Devil welding electrodes furnished by the **Champion Rivet Co.**, Cleveland, were used for this welding job. The welding was under the supervision of **F. J. Giroux**, consulting welding engineer, Long Island City, N. Y.

The Northern California Hardware & Steel Co., San Francisco, has been formed by **Frank J. Bruzzone** and **C. G. Claussen**. The new company will distribute a full line of steel pipe and fittings as well as other wholesale hardware. Both of the principals are well known in Pacific Coast jobbing circles. For a number of years **Mr. Bruzzone** was general manager of **Baker, Hamilton & Pacific Co.** and **Mr. Claussen** at one time was Pacific Coast manager for **B. Nicoll & Co.**



DEPENDABILITY

Modern transportation equipment is as dependable as man can make it, and its users know that this dependability is something which can be relied upon.

We can confidently say the same of West Leechburg strip steel service which, like transportation, has been improved during the 37 years of its development just as fast as the progress of the art permitted.

The users of West Leechburg strip steel are aware of its uniformly high quality and its prompt delivery. To other users of strip steel we extend an invitation to try West Leechburg for a strip steel service that is as dependable as experienced men can make it.

We roll and sell all grades of Allegheny Stainless steel in strip form. Allegheny metal high tensile cold rolled strip was used in the construction of The Burlington Zephyr.

WEST LEECHBURG STEEL COMPANY

UNION BANK BLDG.

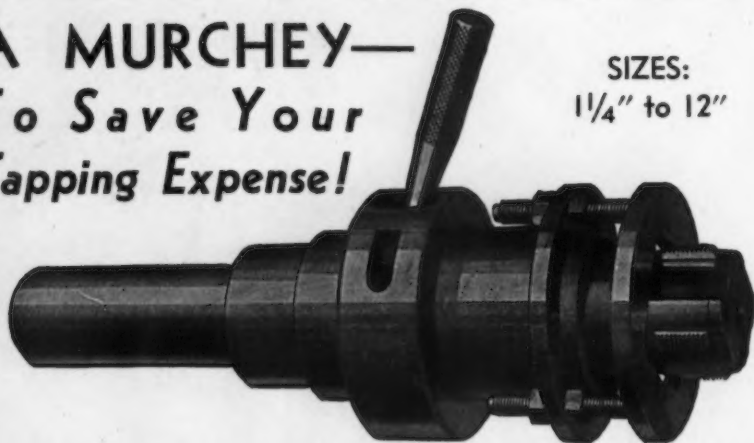


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West Sales Offices: NEW YORK • CHICAGO • DETROIT • CLEVELAND • DAYTON OHIO • ST LOUIS • TOLEDO (Dean Higgins & Co.) • NEW YORK (Edgcomb Steel Corp.) • PHILADELPHIA (Edgcomb Steel Co.) • TORONTO, ONT. (Jessop Steel Co.) BUFFALO—ROCHESTER—SYRACUSE (Brace-Mugler-Huntley Inc.)
 Warehouse Stocks of Cold-Rolled Strip Steel are carried by: EDGCOMB STEEL CO. PHILADELPHIA • EDGCOMB STEEL CORP.—NEWARK • JOS. T. RYERSON & SON—CHICAGO

A MURCHEY— To Save Your Tapping Expense!

SIZES:
1 1/4" to 12"



If you are using solid taps you have a profitable opportunity to reduce your tapping costs with the new Murchey Collapsible Tap.

You can perhaps visualize the time saved by this tap over your solid taps, and the following features assure you of high production free from tap troubles:

1. Chasers move in hardened slots.

2. Chasers collapse positively by cam and rollers.

3. Chasers quickly removed for grinding and quickly reset without removing cap.

4. Tap can be used for stationary and rotating tapping.

Let us tell you what Murchey Collapsible Taps are doing in other plants.

MURCHEY MACHINE & TOOL CO.,

951 Porter St.
Detroit, Mich.

Workplace Layouts That Save Time Effort and Money

(Concluded from Page 30)

time and direction. The matter of balance is a study in itself, but in general, it may be said that if motions are confined to low classes within easily reached areas, conditions are most favorable for securing balance.

When a good layout has been worked out, it should be used every time the job is done. If a job is not worked upon continually, the set-up is likely to be torn down when one order is finished, and when the next order comes through, the set-up may not be made as originally worked out. The methods engineer will have records which show how the set-up should be made, but a routine should be established so that it is not necessary to consult him again after he has once worked out the layout.

On bench assembly work, this can best be accomplished by arranging the material containers on a light frame made of strap iron as shown in Fig. 2. When an order is finished, the set-up is picked up bodily and is stored until wanted again. The position of the containers on the frame and the material they hold may be painted on the bottom of the containers, so that they will always be placed in the same position.

Where many such set-ups are used, several designs of racks and containers can be adopted as standard. They

can then be manufactured cheaply in quantities. When a new job comes to the shop, the methods engineer can determine the type of rack and containers which should be used and can often make the entire set-up in an hour or less. When racks and containers are available, it will be possible to make efficient set-ups for comparatively small quantity work.

If layouts can not be preserved physically, as is the case in nearly all work but bench assemblies, they should be recorded on paper by means of dimensioned sketches and descriptive notes. The layout record can be included on the instruction sheet which goes to the operator with the job if these are to be used, or if not a special workplace layout file may be maintained.

Study Shows Capital Dissipation in '31-'32

MORE capital was used up than created in 1931 and 1932 and the net amount of capital formation in 1933 was small, according to the results of an 18 months' study of the flow of durable goods by the National Bureau of Economic Research. A net loss or net gain is disclosed by comparing estimates of gross capital formation with current depreciation

charges on existing plant and equipment.

Total gross capital formation in its broadest definition is estimated as having been \$34,491,000,000 in 1929 and \$14,879,000,000 in 1933. The average for the 14-year period, 1919 to 1932, is \$27,329,000,000. This total embraces cost to final consumers of all finished durable commodities, including construction, plus net change in business inventories and in international balances.

In 1929, capital formation exclusive of construction included \$8,366,000,000 going to business investors and \$10,058,000,000 going to ultimate consumers. The comparable figures in 1933 were \$2,626,000,000 and \$3,737,000,000 respectively. The third major item, construction including repairs, accounted for \$14,381,000,000 in 1929 and \$5,253,000,000 in 1933.

Foundry Equipment Orders Up Sharply

The index number of net orders for foundry equipment placed during October was 55.3, compared with 46.40 in September and 42.46 in October last year, according to the monthly report of the Foundry Equipment Manufacturers Association compiled from returns from 22 members. The three months' average of gross orders was 48.3 for October as against 46.7 in September and 44.6 in October last year. The index number of gross orders for machine tool and forging machinery was 79.1 for October, compared with 65.3 in September and 67.1 in October a year ago.

Offers Refinements In Cold-Rolled Strip

ELMINATION of many problems of heat treating is promised by controlled processing of cold-rolled strip steel, as developed by the Blair Strip Steel Co., New Castle, Pa. According to a brochure recently published by the company, the new product assures a number of qualities usually found only in high-priced low-alloy steels and not ordinarily offered in plain carbon steel strip.

The company utilizes a steel of uniformly controlled grain structure and the strip after cold-rolling by the new process is claimed to offer continuous uniformity in cold working, unusual physical properties, machinability, longer die life and remarkable heat treatment adaptability.

The General Electric Co. has declared the 149th dividend on common stock and the 49th dividend on special stock, payable to stockholders of record on Dec. 28, 1934. The dividends on both common and special stock of 15c. a share are to be paid on Jan. 25, 1935.